

PURC[™] Radio Paging Stations Control and Application

MUST BE USED WITH Associated Station Manual

Instruction Manual

68P81060E70-A

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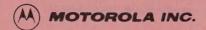
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EPS-27734-O

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FPS-34440-A



GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

INSTRUCTION MANUAL AFFECTED:

68P81060E70-A

PURC Radio Paging Stations Control and Applications

REVISION DETAILS:

- The procedure to set maximum deviation is changed. Replace paragraph 2.2 in Jumper Options and Transit Audio Level Setting section 68P81062E31-0 with the procedure given below.
 - 2.2 Set Maximum Deviation
 - 2.2.1 Without TRN5347A Voice
 Actuated Response Module (VAR)

Step 1. (pre-emphasized audio only) Set modulation as in paragraph 2.1, and adjust exciter IDC control for ±5 kHz total deviation.

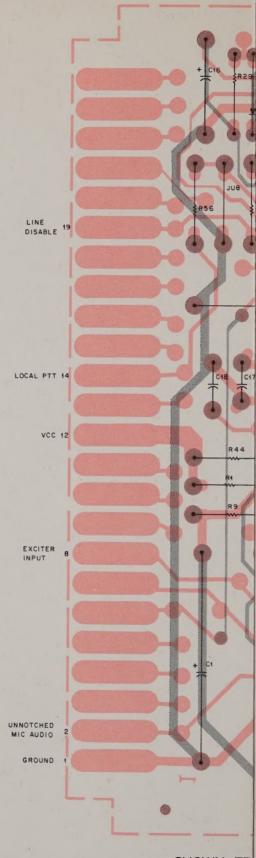
Step 2. (flat audio only) Set modulation as in paragraph 2.1. adjust flat audio IDC control fully clockwise. Adjust exciter IDC control for ±5 kHz total deviation.

2.2.2 With (VAR), the following procedure applies:

PURC TRANSMIT AUDIO LEVEL ADJUSTMENT

- Step 1. Set VAR DISABLE switch on VAR to DISABLE position.
- Step 2. Turn R43 fully clockwise on VAR, for maximum output.
- Step 3. Turn R28 fully clockwise on TRN5348A Flat Audio Board to set minimum resistance.
- Step 4. Set PRE-EMP/FLAT switch on VAR to FLAT position.
- Step 5. Apply a 1 V rms, 1 kHz tone to TRN4859A Line Driver XCTR LEVEL jack.
- Step 6. Adjust exciter IDC control for ± 5 kHz peak deviation.
- Step 7. Adjust input level of 1 kHz tone for ±3 kHz deviation.
- Step 8. Set PRE-EMP/FLAT switch on VAR to PRE-EMP position.
- Step 9. Adjust R43 on VAR for ±3 kHz deviation.
- Step 10. Apply a 1 kHz test tone (from phone line) to TRN4859A Line Driver XMTR LINE input, and adjust R39 on line driver for ±3 kHz deviation.
- Step 11. Set VAR DISABLE switch to ENABLED position (opposite DISABLE position).
- 2. Information for TRN5347A Voice Actuated Response Module is added to the instruction manual listed above.





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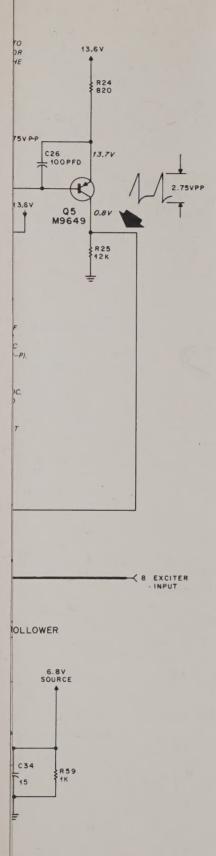
NOTE:

- 1. R53 MOUNTED ON SOLDER SIDE.
 2. S1 AND S2 MOUNTED ON FRONT PANEL.

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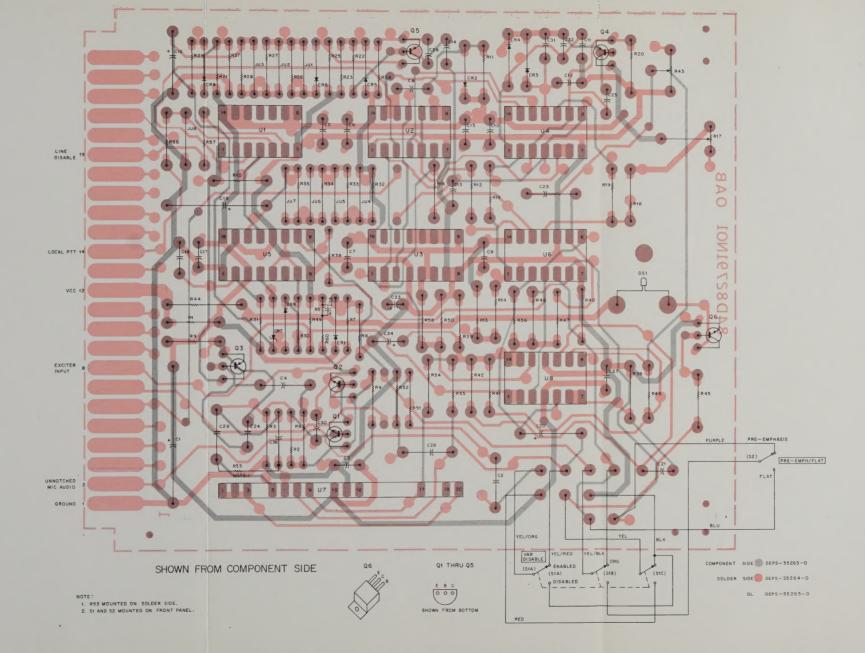
VOICE ACTUATED RESPONSE MODULE

MODEL TRN5347A



FUNCTION

The Voice Actuated Response Module (VAR) monitors the type of audio that is present at the Unnotched Mic Audio (pin 2). If tones are present, the VAR routes this audio to the buffer which has a constant gain throughout the audio frequency range. If voice is present, the VAR provides EIA 6 db per octave preemphasized audio response.



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parts list

REFERENCE	Actuated Respon	
SYMBOL	PART NO.	DESCRIPTION
		capacitor, fixed: uF ± 10%; 50 V: unless otherwise stated
C1	23-84669A19	100 uF + 150-10%; 20 V
22	8-82905G11	0.22
02 03 04	8-11017B08	.01
54 25 6 7	8-82905G11 8-11017B08	0.22
05, 6, 7 08	21-82187B20	.001 uF ± 10%; 100 V
9. 10	8-11017B08	.01
11. 12	8-11017A08	.01 uF ± 5%: 50 V
011, 12 013	8-11017A17	.01 uF ± 5%; 50 V 0.1 uF ± 5%; 50 V
14, 15	8-11017B08	.01
216	23-82783B08	1.0 LF ± 20%; 35 V
017	8-11017B08	.01
18	21-82187B20	.001 uF ± 10%; 100 V
19	23-83214C15 23-84762H08	4.7 µF ± 20%; 25 V 3.9 µF ± 20%; 15 V .001 µF ± 3%; 100 V
20	21-82537B38	3.9 UF ± 20%; 13 V
21	21-02007000	NOTUSED
23	8-82905G11	0.22
24, 25, 26	21-11014H49	100 pF ±5%; 100 V
227	8-11017B08	.01
28, 29	8-82905G11	0.22
30 31 32	21-11014H49	100 oF ± 5%: 100 V
33	23-84538G01	1.0 µF ± 20%; 35 15 µF ± 20%; 20 V 47 µF ± 20%; 20 V
C33 C34	23-84538G04	15 UF ± 20%; 20 V
C35 C36	23-84538G06 21-11014H49	47 uF ± 20%; 20 V 100 pF ± 5%; 100 V
230	21-11U14H49	100 pr ± 5%; 100 V
		diode: (see note)
CR1	48-83654H02	silicon
CR2. 3. 4	48-83654H01	silicon
CR5	48-83654H02	silicon
CR6, 8, 9	48-83654H01	silicon
		to the state of
DS1	65-83554G01	lamp, incandesent:
JS1	65-83554G01	12 V
		transistor (see note)
21, 2	48-869642	NPN: type M9642
23	48-869649	NPN; type M9642 PNP; type M9649
24	48-869706	NPN: type M9706
25	48-869649	PNP: type M9649
Q6	48-869640	PNP, type M9649 NPN; type M9640
		resistor, fixed: ±5%; 1/4 W:
31	0.440000004	unless otherwise stated
32	6-11009C01 6-11009D18	680k
R3	6-11009D14	470k
34	6-11009C59	2.7k
R5	6-11009C35	270
R6	6-11009C61	3.3k
R7	6-11009C75	12k
R8	6-11009C79	18k
R9	6-11009C45	680
R10 R11	6-11009C83 6-11009C97	27k
H11 R12	6-11009C97 6-11009C49	100k
R12	6-11009C49 6-11009C65	1k 4.7k
R14	6-11009C93	4.7K 68k
R15, 16	6-11009C49	1k
R17	18-84944C03	variable: 10k
R18	6-11009C93	68k
R19	6-11009C49 6-11009C51	1k
R20	6-11009C51	1.2k
R21	6-11009D04	180k
R22	6-11009C75 6-11009C79	12k
R23	6-11009C79	18k
R24	6-11009C47	820
R25	6-11009C75 6-11009C71	12k 8.2k
R26 R27	6-11009C71 6-11009C59	8.2k 2.7k
R28	6-11009C59 6-11009C63	2.7k 3.9k
R29	6-11009D14	470k
R30	6-11009C25	100
R31	6-11009C97	100k
R32	6-11009C73	10k
R33	6-11009C73 6-11009C85	33k
R34	6-11009C91	56k
R35, 36, 37	6-11009C97	100k
R38	6-11009C73	10k
R39	6-11009C49	1k
R40	6-11009C97	100k
R41	6-11009C67	5.6k
R42	6-11009C73	10k
R43 R44	18-83083G16 6-125A01	variable; 25k 10: 1/2 W
H44 R45	6-125AU1 6-11009C61	10; 1/2 W 3.3k
R46, 47, 48	6-11009C97	3.3K 100k
R49	6-11009C49	1k
R50	6-11009C97	100k
R51, 52	6-11009C97 6-11009C75	12k
R53	6-11009C99	120k
R54 thru 58	6-11009C97	100k
R59	6-11009C49	1k
R60	6-11009C15	39

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		switch:
S1	40-83204B03	dpdt
52	40-83204B01	dpdt
		integrated circuit: (see note)
U1	51-82884L66	guad 2-input nand Schmitt
U2	51-82884L05	quad 2-input nand gate
U3	51-82884L10	dual j-k flip-flop
U4	51-82884L14	guad analog switch
U5	51-82884L53	dual precision monostable
U6	51-82884L14	guad analog switch
U7	1-80717D13	hybrid notch filter
U8	51-82609M05	quad op-amplifier
		voltage regulator: (see note)
VR1	48-82256C12	Zener type
	me	echanical parts
	3-125790	SCREW, machine: 4-40 x 5/16"; 2 used
	45-83914G01	GUIDE CARD; 2 used
	46-84703E01	GUIDE CARD; circuit board
	61-855798	JEWEL, GRN
	9-84285C01	SOCKET, wedge base
	29-8167C01	TERMINAL, strain relief; 11 used
	9-83697M01	RECEPTACLE, female; 24 used
	43-865080	BUSHING; 2 used
	28-83916F01	CONNECTOR; 13 used
	64-83163L17	PANEL

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers. GUARD TONE NOTCH PRE-AMPLIFIER DETECTOR BOUS SYMMETRY DETECTOR MONOSTABLE SYMMETRY DETECTOR

VOICE ACTUATED RESPONSE MODULE

MODEL TRN5347A

NOT

- Unless otherwise indicated: resistor values are in ohms; capacitor values are in microfarads; and inductor values are in millihenries.
- Unless otherwise indicated: all waveforms have an amplitude of 13.5 V. All
 waveforms are taken with a 1 kHz sine wave (340 mV p-p) applied to pin 2 of
 module.
- Adjust R17 until the waveform shown on this diagram appears on the positive side of C13.
- Switch S1 shown in enabled position. Switch S2 shown in pre-emphasis position.
- 5. Normal jumper settings are shown below:

	Voice Lat	ched Timer Jus	mpers	
Time	JU4	JU5	JUB	JU7
1 sec	OUT	OUT	OUT	OUT
950 ms	IN	OUT	OUT	OUT
850 ms	OUT	IN	OUT	OUT
800 ms	IN	IN	OUT	OUT
750 ms	OUT	OUT	IN	OUT
700 ms	IN	OUT	IN	OUT
600 ms	OUT	IN	IN	OUT
500 ms	IN	IN	IN	OUT
500 ms	OUT	OUT	OUT	IN
450 ms	SN	OUT	OUT	IN
350 ms	OUT	IN	OUT	IN
300 ms	194	IN	OUT	IN
200 ms	OUT	OUT	594	IN
150 ms	IN	OUT	IN	IN
50 ma	OUT	IN	IN	IN

Jumper JUB is usually IN, it is OUT for link transmitters.

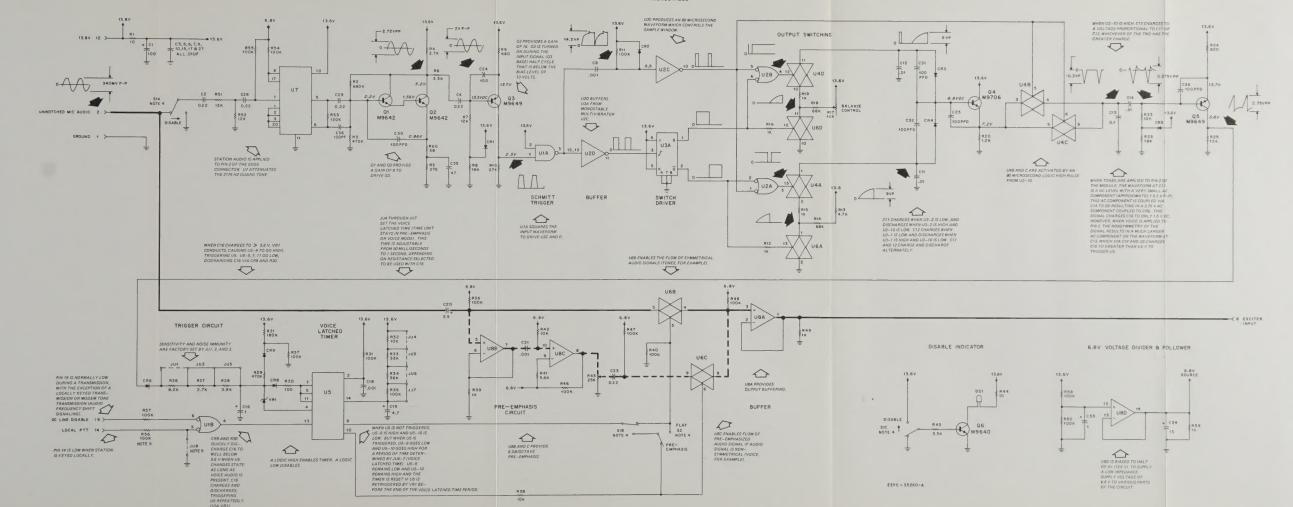
Jumpers JU1-JU3 are usually inserted or removed at the factory to provide the proper sensitivity and noise immunity. Normally JU1 is OUT and JU2, JU3 are

6. This diagram shows positive logic:

- 7. Integrated circuits on this board are CMOS devices.
- 8. IC types and connections for this board are as follows:

Reference Designation	Type	vcc	Gnd	Description
U1	84L86	14	7	Quad 2-Input NAND Schmitt Trigger
U2	84L05	14	7	Quad 2-Input NAND Gate
U3	84L10	16	8	Dual J-K Flip-Flop
U4, U8	84L14	14	7	Quad Analog Switch/Quad Multiplexer
U5	84L53	16	8	Retriggerable/Resettable Monostable Multivibrator
U7	17D13	10	11	Hybrid Notch Filter (Attenuates 2175 Hz)
U8	09M05	4	11	Quad Operational Amplifier

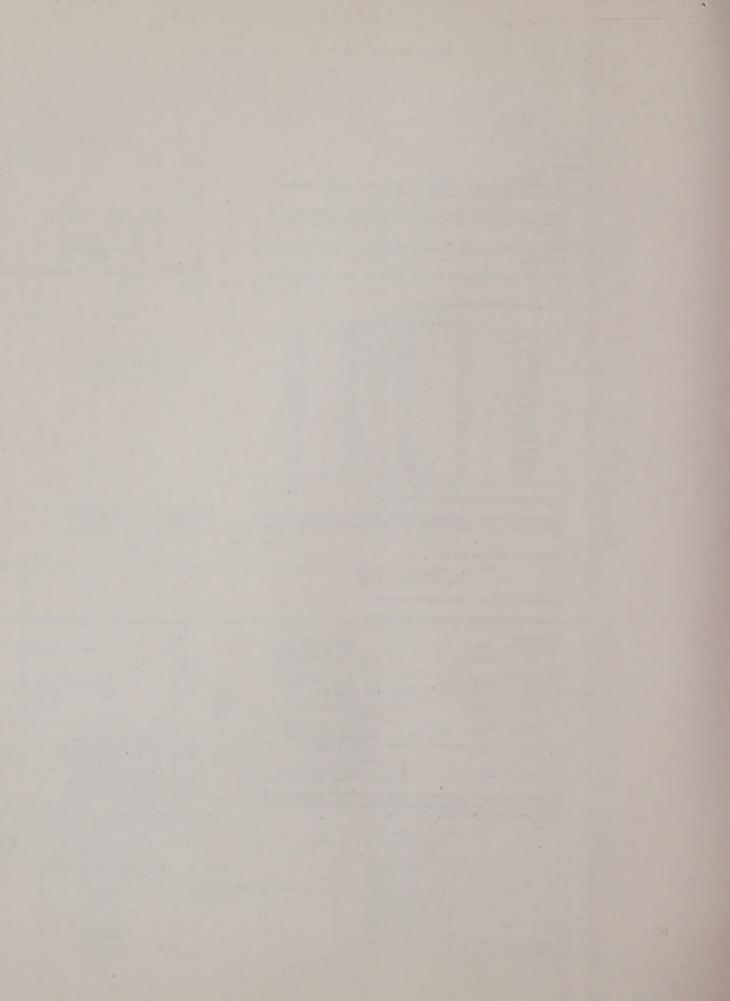
 For paging base station applications, jumper JUS must be in and resistor R55 (100k) must be cut out. For link transmitter applications, jumper JUS must be cut out and resistor R56 must be left in.



FUNCTION

The Voice Actuated Response Module (VAR) monitors the type of audio that is present at the Unnotched Mic Audio (pin 2). If tones are present, the VAR routes this audio to the buffer which has a constant gain throughout the audio frequency range. If voice is present, the VAR provides EIA 6 db per octave preemphasized audio response.

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GENERAL

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INSTRUCTION MANUAL AFFECTED:

68P81060E70-A PURC Radio Paging Stations Control and Application

MODELS AFFECTED:

PURC TRANSMITTER	LINK TRANSMITTER
C64JZB Series	C35JZB Series
C71JZB Series	Q2628A
C73JZB Series	Q2629A
C75JZB Series	Q2630A
C84JZB Series	Q2631A

REVISION DETAILS:

The following wire connections and jumpers are added to TRN4860A Unified Remote Control Board.

Wire additions on all models:

	FROM	TO	
COLOR	MODULE-PIN	MODULE-PIN	FUNCTION
BLU	4-16	. 2-7	KEYED A-
YEL	9-21	J4-9	INTERCOM HI
WHT	10-19	9-19	DC LINE DISABLE
WHT .	9-19	6-13	DC LINE DISABLE
YEL/BRN	10-14	11-13	LOCAL PTT
RED/YEL	9-10	12-10	9.6 V DC

Jumper additions:

				PURC	PURC /		
				MODELS	MODELS		
		FROM	TO .	HTIW	WITHOUT	WITH	LINK
JUMPER	COLOR	MODULE-PIN	MODULE-P1N	SCM	SCM	TOT	MODELS
JU8	WHT	J4-1	J100-10	IN	IN	IN	IN
JU9	VIO/WHT	12-5	12-8	OUT	OUT	IN	OUT
JU10	VIO	12-5	9-24	OUT	OUT	OUT	· LN
JU11	ORG/WHT	12-6	11-14	OUT	OUT	1N	OUT
JU12	ORG	12-6	11-24	OUT	OUT	OUT	1N
JU13	GRN	12-2	4-8	OUT	OUT	OUT	OUT
JU14	WHT/GRN	12-2	12-1	OUT	OUT	OUT	IN
JULS	BRN	2-17	6-18	OUT	IN	OUT	OUT
JU16	WHT/BLK	5-13	6-13	OUT	OUT	THO	LN



GENERAL.

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INSTRUCTION MANUAL AFFECTED:

68P81060E70-A PURC Radio Paging Stations

REVISION DETAILS:

The TLN2559A Simulcast Control Module is a new unit that has been added to the *PURC* station. Add the attached information to your *PURC* manual immediately following the PAGING SYNTHESIZER section 68P81062E72.





TLN2559A PURC SIMULCAST CONTROL MODULE

1. GENERAL DESCRIPTION

1.1 The TLN2559A Simulcast Control Module (SCM) is a plug-in unit for the remote control chassis of a Micor PURC Paging Station. It consists of two circuit boards, TRN5379A Control Board and TRN5603A Logic Board, fixed together to form the module. The SCM replaces the Function Tone Decoder in the PURC station, providing the keying function to the Paging Transmitter in response to one of three input signals - (a) Push-To-Talk (PTT) Control, (b) Local PTT; and (c) Line PTT. Key-up output signals are provided on the F1 Oscillator Ground and PL disable lines.

- 1.2 The TRN5379A Control board has the interface circuitry required to connect the microcomputer on the TRN5603A Logic Board to the base station and an on-board power supply to run the Logic Board.
- 1.3 The TRN5603A Logic Board contains the MC6803 microcomputer, program ROM, code selector switches, and the support devices for the microcomputer.

2. OPERATION

2.1 The basic function of the SCM is to decode Function Tone (FT) inputs and key the transmitter in response to correct codes. The three key-up request lines on the SCM have different levels of priority. PTT Control and Line PTT are immediate-response inputs with lower priority than Line PTT. Line PTT initiates the computer examination of the FT input line. The FT input goes through waveshaping circuitry and is then applied to the computer. The computer compares the FT input sequence to the code set in the selector switches to determine if the transmitter should be keyed up or not. The Group and Function Tone selection is done according to the following tables:

	Group Selection			
Group	G2	G3		
1	on	on		
2	on	off		
3	off	on		
0	off	off		

Note: Station cannot be disabled when Group 0 is selected.

Function Tone Selection

Tone Switch (S1)	Tone Frequency (Hz)
T10	. 750
Т9	950
Т8	1050
T7	1150
Т6	1250
T5	1350
T4	1450
T3	1550
T2 .	1650
T1	1750

KT1, end-of-sequence indicator tone, is 1950 Hz.

- 2.2 The SCM provides the Delayed Keyed A+ signal to the PURC station in response to a Keyed A+ input signal. The Delayed Keyed A+ stays active for about 180 ms after the Keyed A+ signal drops out. This delay allows the station to have an active A+ signal during temporary losses of Keyed A+ that can occur during mode changeover sequencing. Delayed Keyed A+ also keeps the SCM active during these short periods.
- 2.3 A Line PTT input signal causes the SCM to generate DC Line Disable and FT Window Control signals. DC Line Disable causes the Guard Tone Module to hold Line PTT active. If the function tone sequence stops before the SCM detects KT1, the FT Window control will time out and DC Line Disable will also become inactive about 60 milliseconds after tone input stops. If the computer detects too many function tones the DC Line Disable is dropped. In either case the latest tones are wiped from memory and the SCM returns to input line scanning. In normal operation the FT Window Control closes and DC Line Disable drops after the SCM detects KT1.

2.4 The F1 Oscillator Ground and PL Enable outputs become active after all conditions have been met. Since F1 Oscillator Ground is the final transmitter key-up control, any condition that would inhibit the transmitter will causes this signal to become inactive.

3. CIRCUIT DESCRIPTION

3.1 INPUT CIRCUITS

3.1.1 PTT Key-Up Lines

The PTT inputs are normally high and go low when active. The 12 volt input is converted to a logic-compatible 5 volts by input buffer U14. The buffer's outputs then go directly to the input port of microcomputer U1.

3.1.2 Keyed A +

The Keyed A + signal is applied to transistor Q8. Q8 charges C13 and causes Q9 to saturate. Q10 is normally on at this time, but has no effect. When the Keyed A + signal goes low Q8 shuts off and C13 begins to discharge through the network of R19-R20-R21-R22-R25, keeping Q10 shut off. After the discharge time period set by C13 and the resistor network, Q10 conducts, shutting off Q9. Delayed Keyed A + then goes low.

3.1.3 Function Tone Input

Sine wave tones from the audio line come into lower and upper peak detectors U10A and U10B, respectively. The peak levels are applied to opposite ends of divider network R26-R27-R28. Transmission gate U11 shifts the reference of comparator U10D to either the high-level or low-level reference point of the divider string. Since the circuit is wired in a hysteresis configuration, U11 selects the high-level reference if the input signal is below the reference point, and vice-versa. The output of U10D is a clean square wave signal which is passed through Q11, and then to the computer.

3.2 OUTPUT CIRCUITS

DC Line Disable, FT Window Control, and F1 Oscillator Ground are all transistor outputs driven directly from U1. PL Enable is driven by F1 Oscillator Ground through CR4, which allows PL Enable to be pulled low by another signal in the station without affecting F1 Oscillator Ground.

3.3 MICROCOMPUTER LOGIC

The central logic unit of the SCM is composed of microcomputer U1, octal latch U2, hex buffers U4 and U5 (with associated switch set S1), and address decoders U6 and U7. Timers U8 and U9 perform a watchdog function, keeping track of the computer's timing marks.

3.3.1 Microprocessor

U1 contains the master clock and timing generator, microprocessor, and 128 8-bit bytes of RAM. The processor communicates with the other circuitry of the SCM via four ports. Port 1 (pins 6-10) accepts the conditioned signals from the FT line and services the watchdog circuitry. Diodes CR9 and CR10 set the processor mode as "Extended Multiplexed." Port 2 (pins 13-19) handles all the input/output control signals. Port 3 (pins 22-29) provides the upper eight bits of the address bus. Port 4 (pins 30-37) provides the lower eight bits of address (through octal latch U2) and carries data from the data bus.

3.3.2 ROM

U3 contains the program information the processor needs to detect and process function tones. Address selection is done on pins 1-8, 19, 22, and 23. Data is brought out on pins 9-11 and 13-17.

3.3.3 FT Code Programming Circuit

FT codes are determined in switch set F1. The processor requests code information on address lines A14 and A15. The address decoder composed of U6 and U7 then allows the appropriate buffer to output switch code information to the data bus. The device to output data to the data bus is selected according to the following table:

Device	A14	- A15	
ROM	. 1	1	
U4	1	0	
U5	0	1	
not used	0	0	

3.3.4 Watchdog Circuit

In normal operation, U1 generates a "tickle pulse" on the P22 line (pin 10) every 66 milliseconds. A time window is established by monostables U8A and U9 during which the tickle pulse must occur. The incoming tickle pulse triggers both monostables. U9 times out before the next tickle pulse while U8A is continuously triggered. If the tickle pulses are too far apart, U8A times out. The Q output of U8A then triggers U8B, the reset pulse generator. If the tickle pulses occur too close together, U9 is still active when the next tickle pulse occurs and gate U6B clears U8A, again triggering the reset pulse generator. When U8B is triggered, the reset signal passes through Q13 and is sent to the reset pin of U1. The O12-R44-C27 network allows the processor to generate a tickle pulse within about 6 milliseconds after the falling edge of the reset pulse. If U1 does not generate a tickle pulse in this period, U8B sends another reset pulse out. If the tickle pulse occurs normally, U8A is triggered and U8B is shut off.

4. TROUBLESHOOTING

4.1 EQUIPMENT REQUIRED

- -- DC 15 MHz Dual-Trace Oscilloscope
- -- Audio Oscillator
- -- 15 MHz Frequency Counter
- -- Voltmeter
- -- TLN8799A Servicing Board Kit

4.2 FUNCTIONAL TESTS

To service the SCM it will be necessary to first unplug the module, plug in the TLN8799A extension, and then plug the SCM into the extender board. The steel cover can be removed from the TRN5603A Logic Board to gain access to the microcomputer logic assembly.

4.2.1 Power Supply

Measure the voltage on Control Board pin 12 (A+), pin 10 (9.5 V), and U13 pin 3 (5 V). Correct any problems.

4.2.2 Delayed A +

Connect one oscilloscope channel to the Keyed A+ line at pin 24 of the Control Board. Connect the other channel to the Delayed Keyed A+ line at pin 8. Set the oscilloscope to trigger on a low-going transistion occuring on Keyed A+. Apply 12 V to Keyed A+ by using the local PTT switch or a test switch. Release the PTT switch and observe the oscilloscope second channel trace. The trace should show a high-level signal which drops to ground after about 150 milliseconds. If the trace drops immediately, check the timing network for Q10 to determine if there is a component failure. If the trace stays high, check Q9 and Q10.

4.2.5 Control Outputs

The SCM output circuits are simple transistor drivers. Note that PL Enable and F1 Oscillator Ground are returned to a connection in the paging station, not to the SCM ground return. Make all measurements of these leads referenced to the Transmitter Ground, pin 11.

4.2.3 Input Buffer

The input buffer is a non-inverting shifter. 12 V input signals should come out as 5 V level signals. Check all inputs and their corresponding outputs for correct levels. Replace U14 to correct any problems.

4.2.4 Function Tone Conditioning Circuit

Connect the audio oscillator to pin 11 (FT HI) of the Control board through a .01 uF capacitor. Set the frequency to 1 kHz and the amplitude to 6 V p-p. Probe the collector of Q11 (line P20) with the oscilloscope to see a 0-5 V 1 kHz square wave signal. Reduce the generator output to .6 V p-p. The P20 signal remains the same. Measure the DC level of FT HI with no audio signal applied. Apply signal and observe U11 pin 14 (comparator reference point) with the oscilloscope. The DC level at this point is the same as that of FT HI, but with a square wave of about 10% of the audio signal level applied to FT HI. Vary the audio signal amplitude and observe the square wave signal amplitude change. If the comparator reference does not show this hystersis effect, check peak detectors U10A and U10B and their associated components, and transmission gate U11.

SCM/STATION JUMPERS (refer to Station Module Jumper Charts)

Non-Unified Main Board TRN5349A (Low Band and VHF 330 Watt Stations)	w/board part no. 84-84212N01	- remove JU15
oo waa danom,	w/board part no. 84-83601N01	- remove JU15 - jumper Option Slot pin 10 to SCM pin 10 - jumper Guard Tone Decoder pin 13 to SCM pin 19
Unified Main Board TRN4860A (Low Band through 960 MHz Low Power and UHF High Power) TSI Module TRN4853A Station control Module TRN4854B	,	- jumper Option Slot pin 10 to SCM pin 10 - jumper Guard Tone Decoder pin 13 to SCM pin 19 - remove CR13 - remove JU8
Station Control Module TRN4854A Digital Modulator Module TRN4856A,B F1 Module TLN5293A w/optional Link Receiver	Unified Chassis TRN4854B	- remove Q12 - remove module - remove C23 and C32



SIMULCAST CONTROL MODULE

IMULCAST CONTROL MODULE

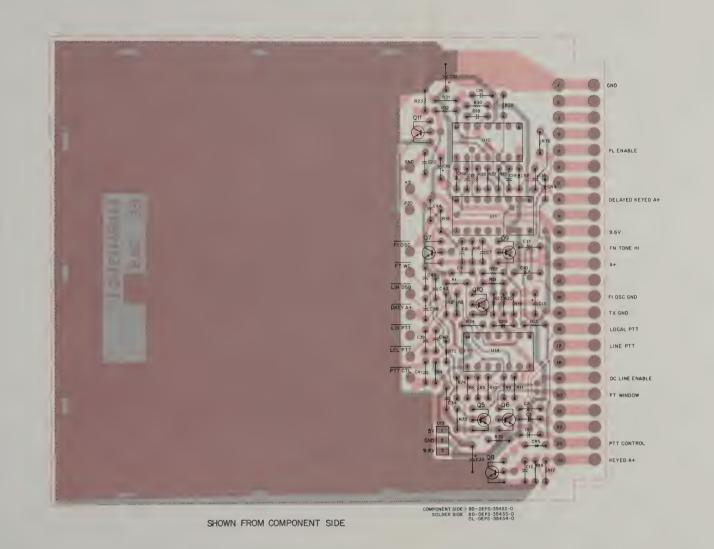
CIRCUIT BOARD DETAIL TRN5379A CONTROL BOARD

parts list

REFERENCE	MOTOROLA PART NO.	DESCRIPTION
SYMBOL	PART NO.	
C1 2 2	21-11015B13	capacitor, fixed: .001 uF ± 10%; 100 V
C1, 2, 3 C6	23-84538G06	47 uF ± 20%; 20 V
C7, 8, 9	21-11015A05	.0047 uF + 80 - 20%; 100 V
C11	21-11015A07	.01 uF + 80 - 20%; 100 V
C12	21-82187B04	270 pF ± 10%; 500 V
C12	23-82783B24	15 uF ± 10%; 25 V
C14	21-82610C58	100 pF ± 10%; 100 V
C15,16	23-11019A09	1.0 uF ± 20%; 50 V
C17, 18	21-82610C58	100 pF ± 10%; 100 V
C19	21-11015B13	.001 uF ± 10%; 100 V
C20	21-82187B04	270 pF ± 10%; 500 V
C32	23-84538G06	47 uF ± 20%; 20 V
C34	21-11015A07	.01 uF + 80 - 20%; 100 V
C38 thru 41	21-11015B13	.001 uF ± 10%; 100 V
C42, 43, 44	21-83406D81	20 pF ±5%; 500 V
		diode: (see note)
CR4	48-82392B03	silicon
CR5, 6	48-83654H01	silicon
CR7, 8	48-84616A01	Hot carrier
		transistor: (see note)
Q5, 6	48-869642	NPN; type M9642
Q7	48-869567	NPN; type M9567
Q8	48-869642	NPN; type M9642
Q9	48-869328	PNP; type M9328
Q10	48-869643	PNP; type M9643
Q11	48-869642	NPN; type M9642
		resistor, fixed; ±5%: 1/4 W;
		unless otherwise stated
D1 0 0 4	6 11000E65	4.7k
R1, 2, 3, 4	6-11009E65	4.7K 10k
R5, 6	6-11009E73	10K 100k
R9, 10, 11	6-11009E97	100k 3.3k
R15	6-11009E61	
R16	6-11009E79	18k
R17	6-11009E65	4.7k 10k
R18	6-11009E73	
R19	6-11009E53	1.5k
R20	6-11009E79	18k
R21	6-11009E49	1k
R22	6-11009E45	680
R23	6-11009E75	12k
R24	6-11009E73	10k
R25	6-11009E53	1.5k
R26	6-11009E63	3.9k
R27	6-11009E47	820
R28	6-11009E63	3.9k
R29	6-11009E57	2.2k
R30	6-11009F22	1 meg.
R31, 32	6-11009E87	39k
R33	6-11009E93	68k
R72	6-11009E61	3.3k
R73	6-11009E79	18k
R74	6-11009E61	3.3k
R75	6-11009E79	18k
R76	6-11009E97	100k
		Interested electric (can note)
	E4 000001400	integrated circuit: (see note)
U10	51-83629M09	Quad Low Power Operational Amplifier
U11	51-84887K60	Analog Multiplexer
U13	51-84561L76	Voltage Regulator (1.5A)
U14	51-82764K29	Hex Buffer
		echanical parts
	2-132616	NUT, 6-32 × 1/4 × 3/32 × 1/8"
	3-136194	SCREW, machine: 6-32 × 3/8"
	7-84560N01	BRACKET, heat sink mounting
	26-84434N01	SHIELD

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.





SIMULCAST CONTROL MODULE

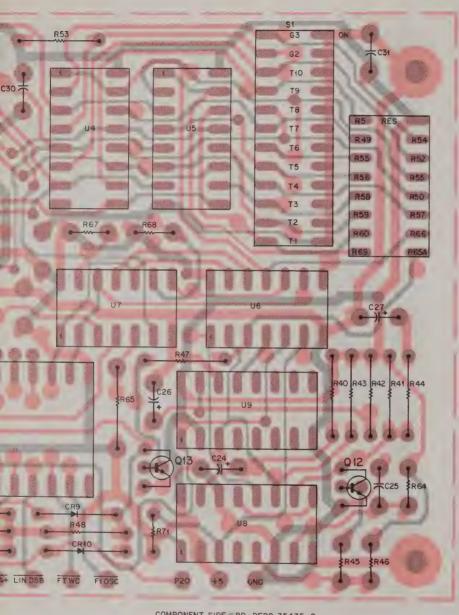
CIRCUIT BOARD DETAIL TRN5379A CONTROL BOARD

parts list

REFERENCE	MOTOROLA PART NO.	DESCRIPTION
31MBOL	FART NO.	
C1, 2, 3	21-11015B13	capacitor, fixed: .001 uF ± 10%; 100 V
C6	23-84538G06	47 uF ± 20%; 20 V
C7, 8, 9	21-11015A05	.0047 uF + 80 - 20%; 100 V
C11	21-11015A07	.01 uF + 80 - 20%; 100 V
C12	21-82187B04	270 pF ± 10%; 500 V
C13	23-82783B24	15 uF ± 10%; 25 V
C14	21-82610C58	100 pF ± 10%; 100 V
	23-11019A09	1.0 uF ± 20%; 50 V
C15,16	21-82610C58	100 pF ± 10%; 100 V
C17, 18 C19	21-11015B13	.001 uF ± 10%; 100 V
C20	21-82187B04	270 pF ± 10%; 500 V
C32	23-84538G06	47 uF ± 20%; 20 V
C34	21-11015A07	.01 uF + 80 - 20%; 100 V
C38 thru 41	21-11015B13	.001 uF ± 10%; 100 V
C42, 43, 44	21-83406D81	20 pF ± 5%; 500 V
C42, 43, 44	21-03400001	20 pr ± 570, 500 v
		diode: (see note)
CR4	48-82392B03	silicon
CR5, 6	48-83654H01	silicon
CR7, 8	48-84616A01	Hot carrier
0.17,0	13 040 10A01	
		transistor: (see note)
Q5, 6	48-869642	NPN; type M9642
Q7	48-869567	NPN; type M9567
Q8	48-869642	NPN; type M9642
Q9	48-869328	PNP; type M9328
Q10	48-869643	PNP; type M9643
Q11	48-869642	NPN; type M9642
		resistor, fixed; ±5%: 1/4 W;
		unless otherwise stated
R1, 2, 3, 4	6-11009E65	4.7k
R5, 6	6-11009E73	10k
R9, 10, 11	6-11009E97	100k
R15	6-11009E61	3.3k
R16	6-11009E79	18k
R17	6-11009E65	4.7k
R18	6-11009E73	10k
R19	6-11009E53	1.5k
R20	6-11009E79	18k
R21	6-11009E49	1k
R22	6-11009E45	680
R23	6-11009E75	12k
R24	6-11009E73	10k
R25	6-11009E53	1.5k
R26	6-11009E63	3.9k
R27	6-11009E47	820
R28	6-11009E63	3.9k
R29	6-11009E57	2.2k
R30	6-11009F22	1 meg.
R31, 32	6-11009E87	39k
R33	6-11009E93	68k
R72	6-11009E61	3.3k
R73	6-11009E79	18k
R74	6-11009E61	3.3k
R75	6-11009E79	18k
R76	6-11009E97	100k
nio	0.11003231	1001
		integrated circuit: (see note)
U10	51-83629M09	Quad Low Power Operational Amplifier
U11	51-84887K60	Analog Multiplexer
U13	51-84561L76	Voltage Regulator (1.5A)
U14	51-82764K29	Hex Buffer
		echanical parts
	2-132616	NUT. 6-32 × 1/4 × 3/32 × 1/8"
	2-132616	NUT, 6-32 × 1/4 × 3/32 × 1/8" SCREW, machine: 6-32 × 3/8"
	2-132616 3-136194 7-84560N01	NUT, 6-32 × 1/4 × 3/32 × 1/8" SCREW, machine: 6-32 × 3/8" BRACKET, heat sink mounting

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

68P81063E72-O (Sheet 1 of 3) 12/17/82 - V & G



COMPONENT SIDE 6 BD - DEPS-35435 - O SOLDER SIDE 6 BD - DEPS-35436 - O OL - DEPS - 35437 - O

SIDE

MULCAST CONTROL MODULE

MODEL TLN2559A

FUNCTION

Decodes Function Tone signals and keys the transmitter in response to correct code sequences.

parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	3-125790	SCREW, machine: 4-40 × 5/16"; 6 used
	45-83914G01	GUIDE, card; 2 used
	46-84703E01	GUIDE, circuit board
	64-83163L16	PANEL

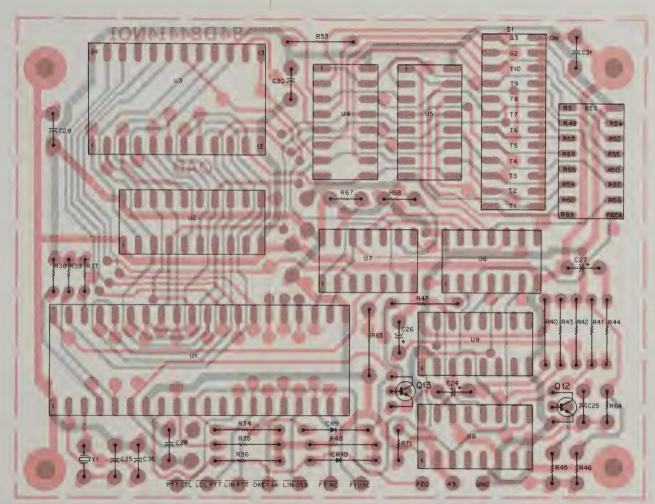
SIMULCAST CONTROL BOARD

CIRCUIT BOARD DETAIL TRN5603A LOGIC BOARD

parts list

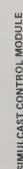
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed:
C24	23-11013D09	4.7 uF ± 10%; 20 V
C25	8-11017A15	.056 uF ± 5%; 50 V
C26	23-11013D09	4.7 uF ± 10%; 20 V
C27	23-11013C56	22 uF ± 20%; 15 V
C28 thru 31	21-11015A07	.01 uF + 80 - 20%; 15 V
C35, 36	21-11014H35	27 pF ±5%; 100 V
		diode: (see note)
CR8, 9	48-82392B03	silicon
		transistor: (see note)
Q12, 13	48-869642	NPN; type M9642
		resistor, fixed; ±5%: 1/4 W;
		unless otherwise stated
R34, 35, 36	6-11009C65	4.7k
R37	6-11009E65	4.7k
R38, 39	6-11009E25	100
R40	6-11009C97	100k
R41	6-11009C77	15k
R42	6-11009C73	10k
R43	6-11009C65	4.7k
R44	6-11009C10	24
R45	6-11009E17	47
R46	6-11009C51	1.2k
R47	6-11009C47	820
R48	6-11009C23	82
R49 thru 54	p/o 51-84333G23	3.3k resistor network
R55	p/o 51-84333G23	1.7k resistor network
R56 thru 60	p/o 51-84333G23	3.3k resistor network
R64	6-11009F04	180k
R65	6-11009C51	1.2k
R65A, 66	p/o 51-84333G23	3.3k resistor network
R67, 68, 69	6-11009E65	4.7k
R71	6-11009E73	10k
		switch:
S1	40-83022M04	12 position; spst
		integrated circuit: (see note)
U1	51-83625M06	Microprocessor
U2	51-83627M03	Octal Transparent Latch
U3	51-83625M94	ROM
U4, 5	51-84561L77	Hex Buffer, 4-bit and 2-bit (3-state)
U6	51-84371K83	Quad 2-input NAND gate
U7	51-84561L04	Quad 2-input NAND gate
U8, 9	51-84561L11	Monostable Multivibrator
Y1	48-82611M03	crystal: (see note) 3.9672 MHz
		chanical parts
	9-84924E01	SOCKET, 24-contact
	14-84602K02	INSULATOR
	29-82713M01	TERMINAL, lug; 20 used

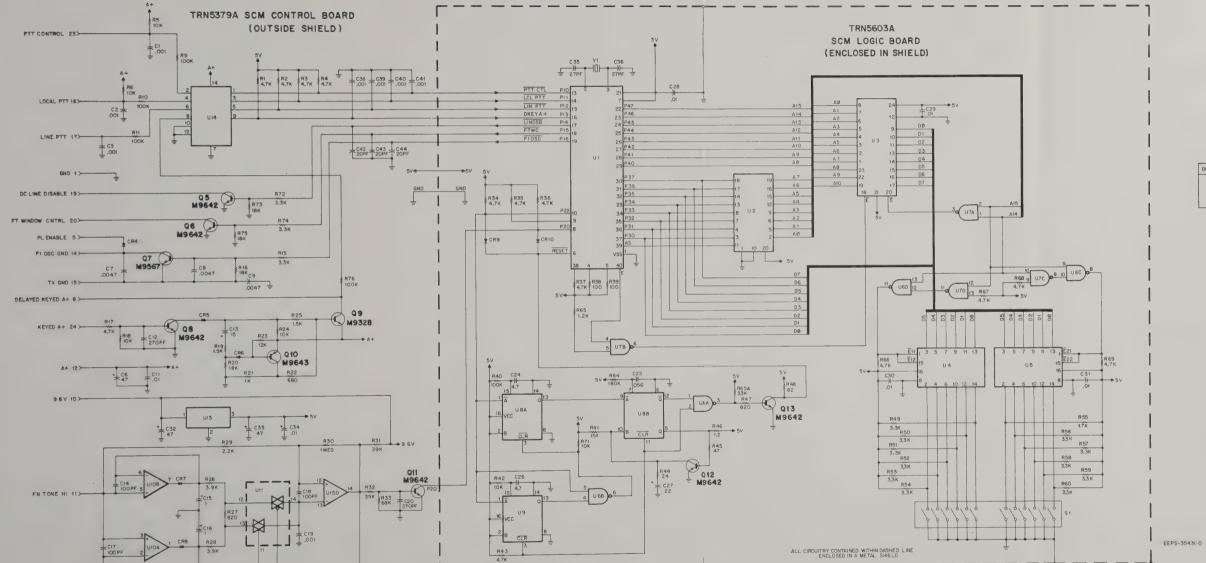
note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.



SHOWN FROM COMPONENT SIDE

COMPONENT SIDE #BD-DEPS-35435-0 SOLDER SIDE #BD-DEPS-35436-0 OL-DEPS-35437-0





	POWER C	D CIRCUIT	
DEVICE	5 VOLTS	9.6 VOLTS	GROUND
U6	14	_	7
U7	14	_	7
U10		4	11
Uff	-	16	6,7,8

FUNCTION

Decodes Function Tone signals and keys the transmitter in response to correct code sequences.

parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	3-125790	SCREW, machine: 4-40 × 5/16"; 6 used
	45-83914G01	GUIDE, card; 2 used
	46-84703E01	GUIDE, circuit board
	64-83163L16	PANEL





GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

INSTRUCTION MANUAL AFFECTED:

68P81060E70-A PURC Radio Paging Stations

REVISION DETAILS:

This revision updates SMR-4521, TLN2559A PURC Simulcast Control Module. The Group Selection Chart at the top of page 1 in section 68P81063E73 has been revised to read:

Group	<u>G2</u>	<u>G3</u>
0	ON	ON
1	OFF	OFF
2	ON	OFF
3	OFF	ON





GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

INSTRUCTION MANUAL AFFECTED:

68P81060E70-A PURC Radio Paging Stations
Instruction Manual

REVISION DETAILS:

The Paging Synthesizer frequency ranges have been expanded to include 132-150 MHz (TLD2592A Synthesizer) and 406-420 MHz (TLE2271A Synthesizer) bands. Modify parts list PL-8091 on PEPS-34989 with the following changes:

TLD9332A	TLE5491A	. Motorola	
Synthesizer Brd. VHF 132-150 MHz			Description
			Capacitor
C42,43	C42,43	21-82537B45	5000 pF; ±1%; 100 V
C715	C715	21-82610C70	150 pF; ±5%; NPO
C716	C716	21-82610C44	100 pF; ±5%; N220
C721	C721	21-82610C09	120 pF; ±5%; N220
C722	C722	21-82610C30	68 pF; ±5%; N330
C725	C725	21-83406D81	20 pF; ±5%; NPO
C726	C726	21-83406D57	13 pF; ±5%; NPO
			Resistor
R25,26	R25,26	6-84376L09	7.6k; ±0.5%; 1/4 W
R137	No Change	6-11009A90	51k; 5%; 1/4 W
Jumpers			
JU6,8	JU6,8	Remove	
JU5,7	JU5,7	Insert	



GENERAL.

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

INSTRUCTION MANUAL AFFECTED:

68P81060E70-A

PURC Radio Paging Stations
Instruction Manual

REVISION DETAILS:

Option C574AD modified the TLB1560A series Synthesizers to NON HIGH STABILITY operation. TPN1195A is deleted and the TLB1560A series is replaced by the TLB1570A series. Frequency stability is now determined by the 2.5ppm KXN1096A Oscillator.

TLB8502A, TLB8503A or TLB8504A Synthesizers are modified as follows. A jumper is added between U18 pin 7 and ground to disable the reference loop. (Located at top of the board at R60.)

RF Carrier Frequency adjustment is now made by warping the KXN1096A (U18).

To return the unit to High Stability Oscillator control the jumper described above is removed and a High Stability reference signal is connected to the Synthesizer Reference input J2 (a BNC connector located in the HSO cavity).



GENERAL SAFETY INFORMATION

The United States Department of Labor, through the provisions of the Occupational Safety and Health Act of 1970 (OSHA), has established an electromagnetic energy safety standard which applies to the use of this equipment. Proper use of this radio will result in exposure below the OSHA limit. The following precautions are recommended:

DO NOT operate the transmitter of a mobile radio when someone outside the vehicle is within two feet (0.6 meter) of the antenna.

DO NOT operate the transmitter of a fixed radio (base station, microwave and rural telephone rf equipment) or marine radio when someone is within two feet (0.6 meter) of the antenna.

DO NOT operate the transmitter of any radio unless all RF connectors are secure and any open connectors are properly terminated.

In addition,

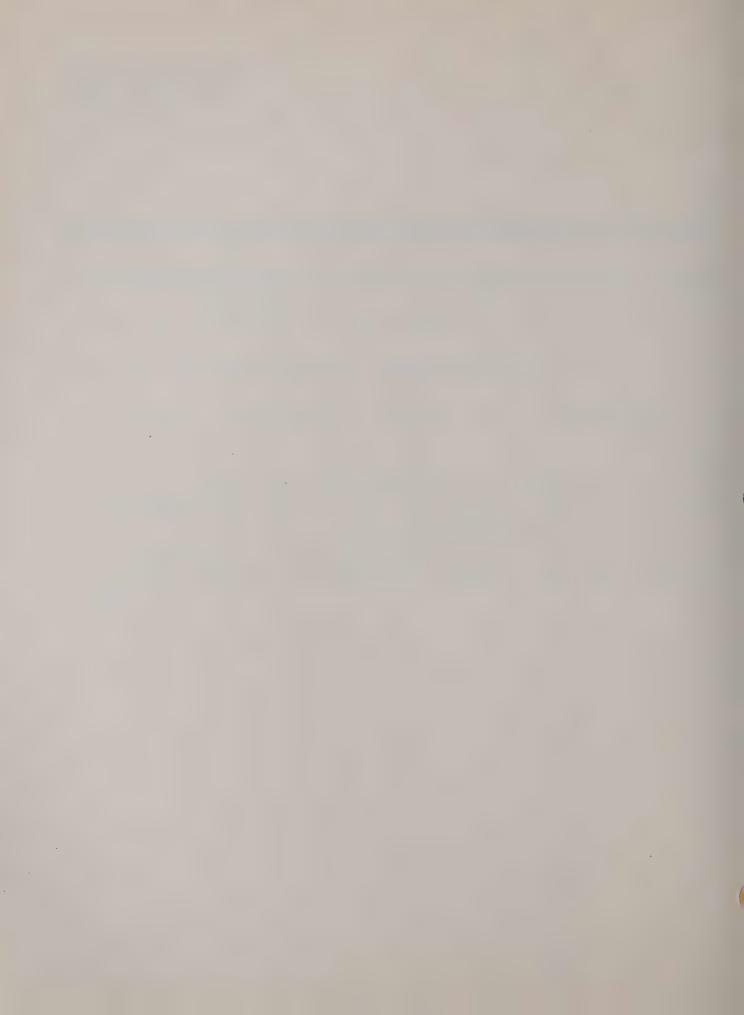
DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.

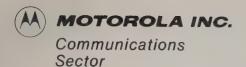
All equipment must be properly grounded according to Motorola installation instructions for safe operation.

All equipment should be serviced only by a qualified technician.

Refer to the appropriate section of the product service manual for additional pertinent safety information.

EPS-28750-O





PURC

RADIO PAGING STATIONS CONTROL AND APPLICATION

SECTION	CONTENTS	NUMBE.
Station Model Chart Exciter/Driver Model Chart Station Model Charts Control Chassis Model Chart	ated Circuit Devices	
	DESCRIPTION	
Introduction	Control.	Page 1 Page 2 Page 3 Page 3 Page 3
JUMPER O	PTIONS AND TRANSMIT AUDIO LEVEL S	ETTINGS
PURC Radio Paging Station Transmit Audio Level Setting	SMIT AUDIO LEVEL SETTING	

DIAGRAMS

STATION BLOCK DIAGRAMPEPS-34628
TCN1383A NON-UNIFIED REMOTE CONTROL CHASSIS INTERCONNECT CHART EEPS-35131
TRN5349A NON-UNIFIED REMOTE CONTROL BOARD CIRCUIT BOARD DETAIL & PARTS LIST PEPS-34629
TCN1282A UNIFIED REMOTE CONTROL CHASSIS INTERCONNECT CHART
TRN4860A UNIFIED REMOTE CONTROL BOARD CIRCUIT BOARD DETAIL & PARTS LIST PEPS-34630
TRN5348A TRANSMITTER FLAT AUDIO BOARD CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
TRN4856B DIGITAL MODULATOR MODULE CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
F1 & F1-PL TONE DECODER MODULES
TRN4853A TRANSMITTER SITE INTERFACE MODULE CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
TRN4859A LINE DRIVER MODULE CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
TRN4892A GUARD TONE DECODER MODULE CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
TRN4854B STATION CONTROL MODULE CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
TRN4854A STATION CONTROL MODULE CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
TRN4857A ALARM LOGIC MODULE SECTION
TLB8170A & TLB8270A SERIES EXCITER SCHEMATIC DIAGRAM, CIRCUIT BOARD DETAIL, & PARTS LIST
TLD5321B & TLD5322B EXCITERS SCHEMATIC DIAGRAM, CIRCUIT BOARD DETAIL, AND PARTS LIST
TLE1720B SERIES EXCITER/1ST BANDPASS FILTER, AND TLE1600B SERIES TRIPLER/LOW LEVEL AMPLIFIER, CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
PAGING SYNTHESIZER SECTION
JUMPER & CABLE CONNECTIONS FOR TDN6869A/70A MODEMS
WATTMETER OPTIONS

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FOREWORD

1. SCOPE OF MANUAL

This manual is intended for use by experienced technicians familiar with similar types of equipment. It contains all service information required for the equipment described and is current as of the printing date. Changes which occur after the printing date are incorporated by Instruction Manual Revisions (SMR). These SMR's are added to the manuals as the engineering changes are incorporated into the equipment.

2. MODEL AND KIT IDENTIFICATION

Motorola equipments are specifically identified by an overall model number on the nameplate. In most cases, assemblies and kits which make up the equipment also have kit model numbers stamped on them. When a production or engineering change is incorporated, the applicable schematic diagrams are updated.

As diagrams are updated, information about the change is incorporated into a revision column. This revision column appears in the manual next to the parts list or, in some cases, on the diagram. It lists the reference number, part number, and description of the parts removed or replaced.

3. SERVICE

Motorola's National Service Organization offers one of the finest nation-wide installation and maintenance programs available to communication equipment users. This organization includes approximately 900 authorized Motorola Service Stations (MSS) located throughout the United States, each manned by one or more trained, FCC licensed technicians.

These MSS's are independently owned and operated and were selected by Motorola to service its customers. Motorola maintenance is available on either a time and material basis or on a periodic fixed-fee type arrangement.

The administrative staff of this organization consists of national, area and district service managers and district representatives, all of whom are Motorola employees with the objective to improve the service to our customers.

Should you wish to purchase a service contract for your Motorola equipment, contact your Motorola Service Representative, or write to:

National Service Manager Motorola Communications and Electronics, Inc. 1303 E. Algonquin Road Schaumburg, Illinois 60196

4. REPLACEMENT PARTS ORDERING

Motorola maintains a number of parts offices strategically-located throughout the United States. These facilities are staffed to process parts orders, identify part numbers, and otherwise assist in the maintenance and repair of Motorola Communications Group products.

Orders for all parts *except* crystals, active filters, code plugs, channel elements, and "Vibrasender" [®] and "Vibrasponder" [®] resonant reeds should be sent to the nearest area parts center. Orders for instruction manuals should also be sent to the area parts center.

When ordering replacement parts or equipment information, the complete identification number should be included. This applies to all components, kits, and chassis. If the component part number is not known, the order should include the number of the chassis or kit of which it is a part, and sufficient description of the desired component to identify it.

Orders for crystals, channel elements, active filters, PROMs, code plugs, and reeds should be sent directly to the factory address listed on the following page. Crystal and channel element orders should specify the crystal or channel element type number, crystal and carrier frequency, and the chassis model number in which the part is used.

Orders for active filters, PROMs, code plugs, *Vibrasender* and *Vibrasponder* resonant reeds should specify type number and frequency, should identify the owner/operator of the communications system in which these items are to be used; and should include any serial numbers stamped on the components being replaced.

5. ADDRESSES

5.1 GENERAL OFFICES

MOTOROLA Communications and Electronics Inc.
Communications & Electronics Parts 1313 E. Algonquin Rd.,
Schaumburg, Illinois 60196
Phone: 312-576-3900

5.2 U.S. ORDERS

WESTERN AREA PARTS

1170 Chess Drive, Foster City, San Mateo, California 94404 Phone: 415-349-3111 TWX: 910-375-3877

MIDWEST AREA PARTS

1313 E. Algonquin Road Schaumburg, Ill. 60196 Phone: 312-576-7430 TWX: 910-693-0869

MID-ATLANTIC AREA PARTS

7230 Parkway Drive Hanover, Maryland 20176 Phone: 301-796-8763 TWX: 710-862-1941

EAST CENTRAL AREA PARTS

12995 Snow Road, Parma, Ohio 44130 Phone: 216-433-1560 TWX: 810-421-8845

EASTERN AREA PARTS

85 Harristown Road, Glen Rock, New Jersey 07452 Phone: 201-444-9662 TWX: 710-988-5602

PACIFIC SOUTHWESTERN AREA PARTS

P.O. Box 85036 San Diego, California 92138 Phone: 714-578-8030 TWX: 910-335-1516

GULF STATES AREA PARTS

1140 Cypress Station P.O. Box 73115 Houston, Texas 77090 Phone: 713-537-3636 TWX: 910-881-6392

SOUTHWESTERN AREA PARTS

P.O. Box 34290 3320 Belt Line Road, Dallas, Texas 75234 Phone: 214-620-8511 TWX: 910-860-5505

SOUTHEASTERN AREA PARTS

P.O. Box 368 Decatur, Georgia 30031 Phone: 504-987-2232 TWX: 810-766-0876

5.3 CANADIAN ORDERS

MOTOROLA LTD.

National Parts Department 3125 Steeles Avenue East Willowdale, Ontario M2H 2H6

Phone: 416-499-1441 TWX: 610-491-1032 Telex: 06-526258

5.4 ALL COUNTRIES EXCEPT U.S. AND CANADA

MOTOROLA, INC.

International Parts Dept.
1313 E. Algonquin Road
Schaumburg, Illinois 60196 U.S.A.

Phone: 312-576-6492 TWX: 910-693-0869 Telex: 722443

Cable: MOTOL PARTS

5.5 FACTORY ADDRESS FOR CRYSTAL, CHANNEL ELEMENT, ACTIVE FILTER, CODE PLUGS, PROMS, AND RESONANT REED ORDERS

ALL MAIL ORDERS

Motorola, Inc.
Component Products Sales & Service
P.O. Box 66191
O'Hare International Airport
Chicago, Ill. 60666

CORRESPONDENCE

Telex: 433-0067

Motorola, Inc.
Component Products Sales & Service
2553 N. Edgington Street
Franklin Park, Illinois 60131
Phone: 312-451-1297
TWX: 910-227-0799

OPERATING FREQUENCY STATION TYPE	Z NON-SYNTHES	NON-SYNTHES	SYNTHESIZE	Z SYNTHESIZE	MODEL CHART
FREO	136-174 MHz	30-50 MHz	30-50 MHz	36-174 MHZ	FOR
RATING	136-1	30-6	30-5	136-1	LOWBAND/HIGHBAND
OPE					PURC RADIO PAGING STATIONS

\rightarrow	ITEM	DESCRIPTION
	KXN1028B	CHANNEL ELEMENT (5 PPM TRANSMIT)
	KXN1018C	CHANNEL ELEMENT (2 PPM TRANSMIT)
QQ	TFB6010A	HARMONIC FILTER
XX	TFB6012A	HARMONIC FILTER (30-36 MHz)
XX	TFB6013A	HARMONIC FILTER (36-42 MHz)
**	TFB6014A	HARMONIC FILTER (42-50 MHz)
	TFD6090A	HARMONIC FILTER (136-174 MHz)
QQ	TLB1550A	EXCITER DRIVER
XX	TLB1552A	EXCITER DRIVER (30-36 MHz)
**	TLB1553A	EXCITER DRIVER (36-42 MHz)
XX	TLB1554A	EXCITER DRIVER (42-50 MHz)
	TLD2580A	EXCITER DRIVER
X	TLD2581A	EXCITER DRIVER (136-150.8 MHz)
X	TLD2582A	EXCITER DRIVER (150.8-162 MHz)
X X	TLD2583A	EXCITER DRIVER (162-174 MHz)
QQ	TLB8140A	POWER AMPLIFIER
XX	TLB8142A	POWER AMPLIFIER (30-36 MHz)
XX	TLB8143A	POWER AMPLIFIER (36-42 MHz)
XX	TLB8144A	POWER AMPLIFIER (42-50 MHz)
	TLD5080A	POWER AMPLIFIER
X X	TLD5081A	POWER AMPLIFIER (136-150.8 MHz)
X X	TLD5082A	POWER AMPLIFIER (150.8-162 MHz)
X	TLD5083A	POWER AMPLIFIER (162-174 MHz)
	TKN6733A	TRANSMITTER CABLE
	TLN1434A	TRANSMITTER SHIELD
	THN6194B	CABINET
	TRN5599A	AC JUNCTION BOX
	TLN5697A	METER PANEL
	TKN8284A	DIGITAL MODULATOR CABLE
	TLN1675A	CHASSIS METER & CABLE
	TRN8686A	SERVICE BOARD CARD PULLER
	TKN8214A	MODEM CABLE
	TLN4198A	AIR DUCT KIT
	TPN1131A	POWER SUPPLY HIGH VOLTAGE
	TPN1132A	POWER SUPPLY LOW VOLTAGE
	TRN5345A	STATION HARDWARE LOW BAND
	TRN5343A	STATION HARDWARE HIGH BAND
	TLN5703A	TRANSFORMER, KIT (POWER SUPPLY 250 W)
	TLN5704A	TRANSFORMER, KIT (POWER SUPPLY 375 W)
	TLN8799A	SERVICE BOARD
	TCN1383A	REMOTE CONTROL CHASSIS
	TLN2376A	GUARD TONE DECODER MODULE
	TLN4658A	F1 CONTROL MODULE
	TRN4853A	TRANSMITTER SITE INTERFACE MODULE
	TRN4854A/B	STATION CONTROL MODULE
MAD	TRN4856B	DIGITAL MODULATION MODULE
	TRN4859A	LINE DRIVER MODULE
00	TPN1195A	POWER SUPPLY; 24 V
00	TRN5480A	SYNTHESIZER HARDWARE
00	TRN5481A	PROM
0	TLD2593A	SYNTHESIZER
	TLB1560A	SERIES SYNTHESIZER

EXCITER/DRIVER MODEL CHART

FOR

PURC RADIO PAGING STATIONS

CODE:

FREG. RANGE 30-50 MHz 136-174 MHz

MODEL TLB1550A TLD2580A

- = ONE SUPPLIED
- = INDICATES A MODEL SERIES

ITEM	DESCRIPTION
TLD1950A	POWER AMPLIFIER & HEAT SINK
TFD6100A	HARMONIC FILTER
TLD5090A	POWER AMPLIFIER
■TLD5320A	EXCITER
TFD6110A	EXCITER FILTER
TKN6569A	TRANSMITTER RF CABLE
TLD5100A	POWER CABLE
TLN5169A	SWITCH & CABLE
TLN5074A	TERMINAL BRACKET
TLN5741A	TRANSMITTER CHASSIS & HEAT SINK
TRN5148A	TRANSMITTER HARDWARE
TLN4729B	INTERCONNECT BOARD
TLB1470A	POWER AMPLIFIER & HEAT SINK
TLB8150A	POWER AMPLIFIER
■TLB8170A	EXCITER
TFB6020A	LOW PASS FILTER
TKN6569A	TRANSMITTER RF CABLE
TKN6580A	POWER AMPLIFIER CABLE
TLB6940A	POWER CONTROL BOARD
TLN5170A	TRANSMITTER METER SWITCH & CABLE
TLN5740A	CAPNETWORK
TRN6423A	RF CONNECTOR
TRN6167A	TRANSMITTER CHASSIS & HEAT SINK
TLN5075A	BRACKET
TRN5417A	TRANSMITTER HARDWARE
NOTE 1*	
NOTE 2*	

EPS-34622-O

*NOTES:

- KITS PERTAINING TO THE TLD2580A EXCITER CAN BE LOCATED IN THE MICOR UPRIGHT BASE & REPEATER (RT) STATIONS INSTRUCTION MANUAL (68P81022E90).
- KITS PERTAINING TO THE TLB1550A EXCITER CAN BE LOCATED IN THE MICOR UPRIGHT BASE & REPEATER (RT) STATIONS INSTRUCTION MANUAL (68P81022E95).

TVDE	0					
STATION T		ZEU	NON-SYNTHESIZED	ZED	NON-SYNTHESIZED	MODEL CHART
12	S S S S S S S S S S S S S S S S S S S	OYN HESIZED	N-SYN	SYNTHESIZED	N-SYNT	FOR
>		2 2	02	SYL	NO	LOWBAND/HIGHBAND
OPERATING FREDIENCY	20 50 MIL-	20-50 MHZ	30-50 MHz	32-174 MHz	132-174 MHz	PURC RADIO PAGING STATIONS
OPFRA			-		_	CODE:
MODE	C71 I7B1101A	C/ 13251 101A	C/13ZB1106A	C73JZB1101A	C73JZB1106A	= ONE SUPPLIED = FREQUENCY SENSITIVE COMPONENT = INDICATES A MODEL SERIES
1		1				ITEM DESCRIPTION

CODE:

	1.		ITEM	DESCRIPTION
			KXN1116AA	CHANNEL ELEMENT (20 PPM TRANSMIT)
			KXN1018C	CHANNEL ELEMENT (2 PPM TRANSMIT)
	0		TCN1381A	REPEATER CONTROL CHASSIS
			THN6318A	CABINET
			TKN6581A	RFCABLE
•	•		TKN6582A	RFCABLE
•			TKN6883A	REPEATER CABLE
0	9 0		TKN6918A	CABLE KIT (USED ON TRANSMIT ONLY STATIONS)
			TKN8214A	MODEM CABLE
			TKN8284A	MODULATOR CABLE
			TLB1400A	POWER AMPLIFIER
Ă,	4	П	TLB1412C	POWER AMPLIFIER, 100 W (30-36 MHz)
Į.	À		TLB1413C	POWER AMPLIFIER, 100 W (36-42 MHz)
			TLB1414C	POWER AMPLIFIER, 100 W (42-50 MHz)
	C	d	TLD1690D	POWER AMPLIFIER
	¥	X	TLD1692D	POWER AMPLIFIER, 100 W (132-150.8 MHz)
	1		TLD1693E	POWER AMPLIFIER, 110 W (150.8-162 MHz)
	7	X	TLD1694E	POWER AMPLIFIER, 110 W (162-174 MHz)
O			TLB1560A	SYNTHESIZER
A			TLB1562A	SYNTHESIZER (30-36 MHz)
			TLB1563A	SYNTHESIZER (36-42 MHz)
		П	TLB1564A	SYNTHESIZER (42-50 MHz)
	*	X	TLD2061A	EXCITER AND FILTER BOARD (132-150.8 MHz)
		Â	TLD2062A	EXCITER AND FILTER BOARD (150.8-174 MHz)
			TLD2593A	SYNTHESIZER
X		П	TLB8270A	EXCITER
		П	TLB8272A	EXCITER (30-36 MHz)
A			TLB8273A	EXCITER (36-42 MHz)
	4		TLB8274A	EXCITER (42-50 MHz)
			TLN2376A	GUARD TONE DECODER MODULE
			TLN4290B	AUDIO PA MODULE
			TLN4658A	F1 CONTROL MODULE
			TLN5902A	TRANSMITTER SHIELD KIT
			TLN5903A	RECEIVER SHIELD KIT
			TLN5914A	RECEIVER SHIELD KIT
			TLN8799A	SERVICE BOARD .
			TPN1110B	POWER SUPPLY
	•		TPN1195A	POWER SUPPLY, 24 V
			TRN4853A	TRANSMITTER SITE INTERFACE MODULE
7			TRN4854A/B	STATION CONTROL MODULE
_			TRN4856B	DIGITAL MODULATOR MODULE
			TRN4859A	LINE DRIVER MODULE
			TRN5342A	STATION HARDWARE, HIGH BAND
	-		TRN5344A	STATION HARDWARE, LOW BAND
			TRN5359A	AC JUNCTION BOX
			TRN5480A	SYNTHESIZER HARDWARE
			TRN5481A	PROM
			TRN6006A	AUDIO AND SQUELCH BOARD, 10 W
			TRN6007A	AUDIO AND SQUELCH BOARD, 10 W
			TRN6423A	RF CONNECTOR
			TRN8686A	SERVICE BOARD CARD PULLER

CONTROL CHASSIS FREQ. RANGE **MODEL CHART** 30-50 MHz and 132-174 MHz 450-512 MHz **FOR PURC RADIO PAGING STATIONS** MODEL CODE: TCN1381A TCN1382A = ONE SUPPLIED DESCRIPTION ITEM TLN5645A TRANSMITTER REPEATER INTERCONNECT BOARD 0 0 TLN5646A RECEIVER REPEATER INTERCONNECT BOARD TLN5894A TRANSMITTER REPEATER INTERCONNECT BOARD TRN4860A INTERCONNECT BOARD TRN5436A CHASSIS HARDWARE TRN5437A CHASSIS HARDWARE EPS-35258-O

TO ALL THE	SIZED	ZED		ZED		
CITAT	SIZED	THESIZ	SIZED	THESIZ		MODEL CHART
	SYNTHESIZED	NON-SYNTHESIZED	SYNTHESIZED	NON-SYNTHESIZED		FOR UHF
2		ž	SY	N		PURC
VORTING COUNTY OF THE	450-512 MHz	450-512 MHz	450-512 MHz	450-512 MHz		RADIO PAGING STATIONS
90	5				CODE:	

MODEL	B84JZB1101A	B84JZB1106A	C64JZB1101A	C64JZB1106A	★ = FF	NE SUPPLIED REQUENCY SENSITIVE COMPONENT DICATES A MODEL SERIES
					ITEM	DESCRIPTION
		•	•		KXN1052A	CHANNEL ELEMENT (TRANSMIT)
					TCN1382A	CONTROL CHASSIS
Ī	•	•			THN6373A	HOUSING
					THN6318A	HOUSING
			•		TKN6804A	CABLE, 75 W
Ì					TKN8007A	CABLE HIGH POWER REPEATER
		•			TKN8008A	CABLE, INTERCONNECT
					TKN8214A	CABLE, MODEM
		9	Ļ	Q	TKN8284A	CABLE, MODULATOR
-	Q	Ö	Q	O	TLE1600B	HYBRID AMPLIFIER/TRIPLER
	×	×	×	A	TLE1603B	HYBRID AMPLIFIER/TRIPLER (450-470 MHz)
_	X	X	X	A	TLE1604B	HYBRID AMPLIFIER/TRIPLER (470-494 MHz)
	X	×	文	文	TLE1605B	HYBRID AMPLIFIER/TRIPLER (494-512 MHz)
H	Y	Y	Y	위	TLE1670B	NETWORK ANTENNA REPEATER
-	A	X	X		TLE1673B	NETWORK, ANTENNA REPEATER (450-470 MHz)
-	A	A	X	A	TLE1674B TLE1675B	NETWORK, ANTENNA REPEATER (470-494 MHz)
	7	A	X	A	TLE16/5B	NETWORK, ANTENNA REPEATER (494-512 MHz)
-	1	A			TLE1693A	POWER AMPLIFIER, 20 W (450-470 MHz)
+	A	4	J	X	TLE1713A	POWER AMPLIFIER, 20 W (470-512 MHz) POWER AMPLIFIER, 75 W (450-470 MHz)
+	+	-	_	Ā	TLE1714A	POWER AMPLIFIER, 75 W (450-470 MHz)
١		$\overline{}$	ô		TLE1720B	EXCITER AND FILTER BOARD
-	Y	I	X	A	TLE1723B	EXCITER AND FILTER BOARD (450-470 MHz)
+	3	2	Â	3	TLE1724B	EXCITER AND FILTER BOARD (470-494 MHz)
Ţ	7 Wat		Ž		TLE1725B	EXCITER AND FILTER BOARD (494-512 MHz)
-		ô			TLE1930A	POWER AMPLIFIER
-	X	Ĭ			TLE1933A	POWER AMPLIFIER (450-470 MHz)
ŀ	A		-		TLE1934A	POWER AMPLIFIER (470-494 MHz)
-	X	7			TLE1935A	POWER AMPLIFIER (494-512 MHz)
Ī		_	•		TLE2273A	SYNTHESIZER, 450-512 MHz
	•	•			TLE4183A	TRANSMITTER SHIELD KIT
					TLN1997A	METERING/INTERCOM KIT
4			•		TLN2376A	GUARD TONE DECODER MODULE
4		<u> </u>	•	9	TLN4290B	AUDIO PA MODULE
1		\rightarrow	-	_	TLN4658A	F1 CONTROL MODULE
1	1		•		TLN4296A	POWER CONTROL
-				_	TLN4296AV	POWER CONTROL
-	의	-	_	1	TLN5697A	METER PANEL
+	잌				TLN5703A	TRANSFORMER .
1				-	TLN8799A TPN1110B	POWER SUPPLY
1		_		4	TPN1110B	
+		-	-	-	TPN1168A	POWER SUPPLY, LOW VOLTAGE POWER SUPPLY, HIGH VOLTAGE
1	레			-	TPN1195A	POWER SUPPLY, 24 V
T					TRN4853A	TRANSMITTER SITE INTERFACE MODULE
-		\rightarrow	_		TRN4854A/B	STATION CONTROL MODULE
+		-	_	_	TRN4856A/B	DIGITIAL MODULATOR MODULE
-		= 1			TRN4859A	LINE DRIVER MODULE
1					TRN5117A	STATION HARDWARE UHF
T		_			TRN5118A	STATION HARDWARE UHF HIGH POWER
_		\rightarrow	•		TRN5198A	SYNTHESIZER HARDWARE
+		-	•		TRN5481A	PROM
T	1	1			TRN5359A	AC JUNCTION BOX
1		\rightarrow	\rightarrow	_	TRN6006A	AUDIO AND SQUELCH BOARD, 10 W
T		-	•		TRN6193A	I RANSMITTER SHIELD, 75 W
1			-	= 1	TRN6194A	RECEIVER SHIELD
_			1		TRN8580A	AC JUNCTION BOX
_		_			TRN8584A	BLOWER
П		1			TRN8686A	SERVICE BOARD CARD PULLER



SAFE HANDLING OF CMOS INTEGRATED CIRCUIT DEVICES

Many of the integrated circuit devices used in communications equipment are of the CMOS (Complementary Metal Oxide Semiconductor) type. Because of their high open circuit impedance, CMOS ICs are vulnerable to damage from static charges. Care must be taken in handling, shipping, and servicing them and the assemblies in which they are used.

Even though protection devices are provided in CMOS IC inputs, the protection is effective only against overvoltage in the hundreds of volts range such as are encountered in an operating system. In a system, circuit elements distribute static charges and load the CMOS circuits, decreasing the chance of damage. However, CMOS circuits can be damaged by improper handling of the modules even in a system.

To avoid damage to circuits, observe the following handling, shipping, and servicing precautions.

1. Prior to and while servicing a circuit module, particularly after moving within the service area, momentarily touch both hands to a bare metal earth grounded surface. This will discharge any static charge which may have accumulated on the person doing the servicing.

NOTE

Wearing Conductive Wrist Strap (Motorola No. RSX-4015A) will minimize static buildup during servicing.

- 2. Whenever possible, avoid touching any electrically conductive parts of the circuit module with your hands.
- 3. Normally, circuit modules can be inserted or removed with power applied to the unit. However,

check the INSTALLATION and MAINTENANCE sections of the manual as well as the module schematic diagram to insure there are no objections to this practice.

- 4. When servicing a circuit module, avoid carpeted areas, dry environments, and certain types of clothing (silk, nylon, etc.) because they contribute to static buildup.
- 5. All electrically powered test equipment should be grounded. *Apply* the *ground lead* from the test equipment to the circuit module *before* connecting the *test probe*. Similarly, *disconnect* the *test probe prior* to removing the *ground lead*.
- 6. If a circuit module is removed from the system, it is desirable to lay it on a conductive surface (such as a sheet of aluminum foil) which is connected to ground through 100k of resistance.

WARNING

If the aluminum foil is connected directly to ground, be cautious of possible electrical shock from contacting the foil at the same time as other electrical circuits.

- 7. When soldering, be sure the soldering iron is grounded.
- 8. Prior to connecting jumpers, replacing circuit components, or touching CMOS pins (if this becomes necessary in the replacement of an integrated circuit device), be sure to discharge any static buildup as described in procedure 1. Since voltage differences can exist across the human body, it is recommended that only one hand be used if it is necessary to touch pins on the CMOS device and associated board wiring.



1301 E. Algonquin Road, Schaumburg, IL 60196

- 9. When replacing a CMOS integrated circuit device, leave the device in its metal rail container or conductive foam until it is to be inserted into the printed circuit module.
- 10. All low impedance test equipment (such as pulse generators, etc.) should be connected to CMOS
- device inputs after power is applied to the CMOS circuitry. Similarly, such low impedance equipment should be disconnected before power is turned off.
- 11. Replacement modules shipped separately from the factory will be packaged in a conductive material. Any modules being transported from one area to another should be wrapped in a similar material (aluminum foil may be used). NEVER USE NON-CONDUCTIVE MATERIAL for packaging these modules.

1. INTRODUCTION

- 1.1 PURC (Paging Universal Remote Control) Radio Paging Stations consolidate binary and sequential tone signaling control functions which are required in paging systems. PURC Radio Paging Stations accommodate 2-tone and 5/6-tone paging formats (either tone only or tone and voice) as well as binary formats. Binary paging requires FSK-NRZ (frequency shift keying with non-return to zero) signaling.
- 1.2 There are two modes of operation for *PURC* Radio Paging Stations:
- audio mode corresponds to commonly used 2-tone or 5/6-tone pager addressing methods (for tone only or tone and voice pagers).

- binary mode used in display paging and certain types of binary and voice pagers (binary address followed by voice message).
- 1.3 Control of *PURC* Radio Paging Stations can be accomplished locally (requires multiple paging terminal to base station connections) or remotely (requires one simplex control path). Remote control is required for distances greater than 100 feet. The following discussion refers to remote control operation.

2. STATION CONTROL

Regardless of whether the binary mode or audio mode of operation is selected, the station control sequence is initiated by 120-140 ms (milliseconds) of high

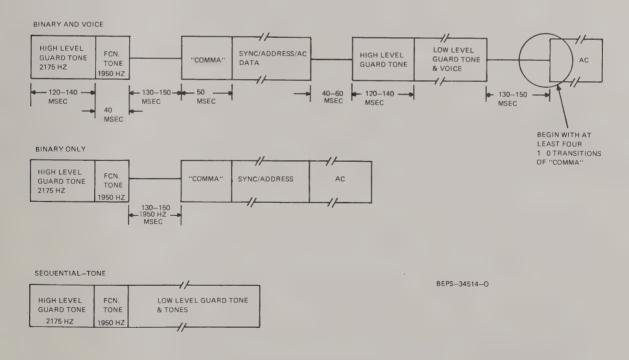


Figure 1. Single Transmitter Sequential Tone Control Format

technical writing services

level guard tone (2175 Hz) followed by 40 ms of function tone (1950 Hz). This sequence keys the base station through control signals originating in the guard tone decoder, F1 control, and station control modules. The rest of the control sequence depends on the type of information, binary or audio, to be transmitted.

3. BINARY CONTROL

(See Figure 1, Binary Only)

3.1 After the guard tone/function tone sequence, binary control is accomplished by a 130-150 ms pause before sending the binary information. This allows the guard tone decoder to drop out and uninhibit the modem in the station. During the 130-150 ms pause, the transmitter remains keyed by the delayed keyed A + voltage from the digital modulator module. After the pause but before the station drops off the air, binary information is send to the station. This information (binary preamble) must begin with 50 ms of an alternating binary 1,0 pattern (comma) received at 600 bps (bits per second). This binary information from the paging terminal is sent to the station via 1200/2200 Hz audio frequency shift signaling (modem tones). A

modem in the paging station decodes the modem tones into logic "1" and "0" dc states. These logic states are level shifted in the transmitter site interface and digital modulator modules for application to the modulator stage in the transmitter. Detection of a 1200 Hz tone is defined as a logic 1 and gives a positive shift to the transmitter carrier frequency. Detection of a 2200 Hz tone is defined as a logic "0" and gives a negative frequency shift to the transmitter carrier frequency.

3.2 The detection of the initial 600 bps binary pattern is immediately converted by the modem and TSI (Transmitter Site Interface) module into a modem PTT signal. This results in the station remaining keyed by reverting to the binary mode (FSK-NRZ). When the station has been properly set up in the binary mode, binary data is transmitted. The transmitter unkeys within 350 ms after the modem tones stop. During the time the station is in the binary mode, the modem PTT signal is routed to the guard tone decoder module to inhibit the audio mode. Therefore the binary and audio modes are independent of each other.

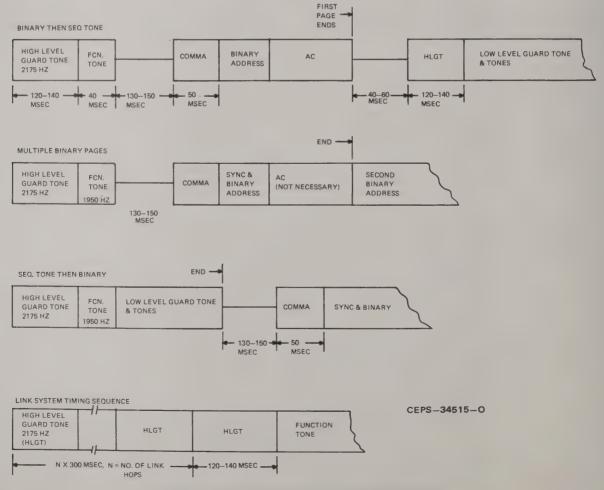


Figure 2. Sequential Tone/Binary Mixed Pager
Tone Control Format

4. AUDIO CONTROL

(See Figure 1 Single Transmitter Sequential Tone Control Format)

- 4.1 After the initial guard tone function tone sequence, audio control is accomplished by sending low level guard tone without any delay after the function tone. The transmitter keys up and the desired paging tones and voice (if required) are then transmitted. Low level guard tone is present during the entire transmission to keep the transmitter keyed. When low level guard tone is removed, the station unkeys within approximately 350 msec. The continuous detection of low level guard tone keeps the modem in the station muted via a relay in the TSI (Transmitter Site Interface) module.
- 4.2 High level guard tone and function tone are sent at +5 dB and -5 dB respectively, referenced to test tone (test tone is the level of 1000 Hz requires to modulate the transmitter ±3 kHz). Low level guard tone is sent out at a level -25 dB referenced to test tone.

5. COMBINED BINARY AND AUDIO CONTROL (See Figure 1 and Figure 2)

A combination of binary and audio control is required for paging in systems with mixed binary and tone signaling, or where tone and voice pagers are used which require a binary address. To initially establish control of the station, high level guard tone and function tone is required as previously described (paragraph 2). Binary or audio control is then established as previously described (paragraphs 3 and 4). If the audio mode is first established and it is desired to switch to the binary mode, a pause of 130-150 ms is sent by the terminal to allow the station to drop out of the audio mode. Binary information is sent out, beginning with 50 ms of comma (alternating 1 and 0 pattern). The remainder of the binary information follows the comma. If multiple binary paging (without voice message) is requried, the binary data must be sent without any pauses to prevent the station from unkeying.

5.2 To switch from the binary mode to the audio mode, a 50 ms pause is sent to allow the station to drop out of the binary mode (loose modem PTT signal). High level guard tone is sent by the paging terminal for 120-140 ms followed immediately by the low level guard tone. The function tone (1950 Hz) is not required. Paging tones or voice is then sent to the station along with continous low level guard tone. To switch back to the audio mode requires a 130-150 ms pause followed by binary information. In the audio mode loss of low level guard tone results in the station unkeying within 350 msec, provided no other information is sent to the station. Similarly, for the binary mode, the station will unkey within 350 msec after modem tones have ended (as sent by the terminal).

6. MULTIPLE PAGE TIMING

Once the station is successfully keyed in either the audio or binary mode, multiple pages of any format may be sent by adhering to the timing required for the audio mode, binary mode, or alternating between audio and binary modes. If paging activity has stopped for more than 160 msec between successive pages to be transmitted, the paging terminal must send a high level guard tone and function tone (1950 Hz) sequence before access to either the audio or binary mode can be determined.

7. LINK STATION TIMING

(See Figure 2 last figure)

When rf control links are used instead of telephone lines, the initial high level guard tone must be extended to insure each transmitter is up to full power and each link receiver is unsquelched. To insure that this condition exists, and additional 300 ms of high level guard tone is sent out for each link (hop).





JUMPER OPTIONS AND TRANSMIT AUDIO LEVEL SETTING

Communications Sector

1. JUMPER OPTIONS

The following jumper information is provided to indicate jumper applicability in various *PURC* Radio Paging Stations.

1.1 RECEIVE AUDIO AND SQUELCH BOARD (OPTIONAL)

Jumper	Carrier Squelch	Tone PL Squelch	Digital PL Squelch	
JU201	IN	OUT	IN	
JU202	IN	OUT	IN	
JU203	IN*	IN*	IN*	
JU204	IN	IN**	IN**	

^{*} IN for 10 W audio

1.2 EXCITER

			Options	
Jumper	Pre- Emphasis	Flat Audio	VAR	
JU401	OUT	OUT	OUT	Ī
JU402	OUT	IN	IN	
R401	OUT	OUT	OUT	
R402, 3	IN	OUT	OUT	
R405	OUT*	OUT*	OUT*	

^{*} IN for PL input on Exciter pin 5

1.3 RECEIVER INTERCONNECT BOARD

For full duplex operation on the TLN6196A model board, remove CR957.

1.4 DIGITAL PL SQUELCH DECODER BOARD

Jumper	Normally	
JU801	IN	
JU802	OUT	
JU803	OUT	

1.5 FLAT AUDIO BOARD (OPTION)

Jumper	Low Band	Mid Band	VHF	UHF	900
JU1	OUT	IN	OUT	OUT	IN
JU2	IN	OUT	IN	IN	OUT
j JU3	OUT	OUT	OUT	OUT	IN
JU4	OUT	IN	OUT	OUT	OUT
JU5	IN	OUT	OUT	IN	OUT
JU6	OUT	OUT	IN	OUT	OUT
JU7	IN	IN	IN ·	IN	OUT
JU8	IN	IN	IN	IN	OUT
JU9	OUT	OUT	OUT	OUT	IN
JU10	IN FOR	ONLY FLAT	AUDIO	OPTION	1

1.6 F1 CONTROL MODULE

	Part or Jumper	Normal Condition	
	JU1	NOT USED	
	JU2	IN	
	JU3	OUT (in on TLN4638A)	
6	C23	IN (out with co-located link receiver)	
	C32	IN (out with co-located link receiver)	

1.7 VOICE ACTUATED RESPONSE (VAR) OPTION

JUMPER

	JU2 JU3	IN IN	Select	Normal Trig	gger Sensitivity		
			1 sec	Hang Times 0.5 sec Nominal	50 ms		
	JU4	,	OUT	OUT	OUT		
	JU5		OUT	OUT	IN		
	JU6		OUT	OUT	IN		
	JU7		OUT	IN	IN		
;	JU8	Normally IN	OUT	for C42JZ	B Link Station		

^{**} cut for "and squelch"

1.8 TRANSMITTER SITE INTERFACE MODULE (MODEL TRN4853A)

Jumper	Normal Condition	Special Applications
JU1	OUT	IN for signal detect key-up
JU2	IN	OUT for inverted data
JU3	OUT	IN for inverted data
JU4	IN	OUT for 387 Hz verification
JU5	IN .	OUT when negative voltage module is used
JU6	OUT	IN when modem is removed
JU7	NOT USED	
JU8	IN	OUT when negative voltage module is used

1.9 DIGITAL MODULATOR MODULE (MODEL TRN4856B)

The following components must be removed depending on the quiescent output voltage of the channel element.

Voltage	Components	
3.98 V - 4.5 V	Remove R24, VR2	
4.50 V - 5.0 V	Remove R24, R25, VR2	
5.00 V - 5.5 V	Remove R11, R24, R25, VR2	
7.80 V - 8.2 V	Remove R25, VR1	
8.2 V - 8.5 V	Remove R11, R25, VR1	

1.10 STATION CONTROL MODULE (MODEL TRN4854B)

Jumper	Normal Condition	Special Applications
JU1	IN	OUT for special applications
JU2	IN ·	OUT for special applications
JU3	IN	OUT for special applications
JU4	IN	OUT for guard tone or modem
		keying
JU5	IN	OUT for special applications
JU6 ·	IN .	OUT for duplex stations
JU7	OUT	IN for PL squelch
JU8	IN	OUT when simulcast control
		module used

Note: Remove Q12 when using simulcast control module.

1.11 LINE DRIVER MODULE (MODEL TRN4859A)

Jumper	Normal Condition	Special Applications
JU1	NOT USED	
JU2	NOT USED	
JU3	OUT	IN for 2-wire stations
JU4	OUT	IN for 2-wire stations
JU5	NOT USED	
JU6	NOT USED	
JU7	IN	OUT for special applications
JU8	IN	OUT for special applications
JU9	IN	OUT for special applications
JU10	OUT	IN for revr line levels of xr-10 dBm
R21	IN	OUT for 2-wire stations
R55	OUT	IN for non-binary stations

1.12 UNIFIED REMOTE CONTROL BOARD (MODEL TRN4860A)

Jumper	Normal Condition	Special Applications
JU1	OUT	IN to remove xmit notch
JU2	OUT	IN for guard-tone only or modem keying
JU3	IN	OUT for non-pre-emphasized xmit audio
JU4	OUT	IN for flat xmit audio
JU5	OUT	IN when using var module
JU6	OUT	IN to remove receive notch
JU7	OUT	IN for non-binary paging applications or non-PL link applications

1.13 NON-UNIFIED REMOTE CONTROL BOARD (MODEL TRN5349A)

	Normal	
Jumper	Condition	Special Applications
JU1	OUT	IN to remove xmit notch
JU2	OUT	IN for guard tone only or modem keying
JU3	. IN	OUT for non-pre-emphasized xmit audio
JU4	OUT	IN for flat xmit audio
JU5	OUT	IN when using var module
JU6	OUT	IN to remove receive notch
JU7	OUT	IN for non-binary paging or non-PL link applications
108	OUT	NOT USED
JU9	OUT	IN when using T.O.T option
JU10	OUT	IN for C42JZB link xmtrs
JU11	OUT	IN when using T.O.T option
JU12	OUT	IN for C42JZB link xmtrs
JU13	OUT	IN when using negative voltage module
JU14 .	OUT	IN For C42JZB link xmtrs
JU15	IN	OUT when using simulcast control module
JU16	OUT	IN for C42JZB link xmtrs

1.14 GUARD TONE DECODER (MODEL TRN4892A)

Jumper	Normal Condition	Special Application
R91	IN	OUT for link receivers with zero dBm link level

2. TRANSMIT AUDIO LEVEL SETTING

NOTE

If station is used without a modem, add jumper JU6 to the TRN4853A Transmitter Site Interface module. JU6 provides a 600 ohm input to the module.

2.1 MAXIMUM DEVIATION CAPABILITY

With 1 volt RMS of 1 kHz audio at the exciter level input on the line driver module, increase transmitter deviation by rotating the exciter IDC control. Transmitter shall be capable of acheiving the maximum deviation specified limit without evidence of modulation break up.

2.2 SET MAXIMUM DEVIATION

Step 1a. Pre-emphasize audio only - with modulation as in paragraph 2.1, adjust exciter IDC control for ± 5 kHz total deviation.

Step 1b. Flat audio only (TRN5348A only) - with modulation as in paragraph 2.1. Adjust flat audio IDC control fully clockwise. Adjust exciter IDC control for ± 5 kHz total deviation.

Step 2. Voice Actuated Response (VAR) both flat and pre-emphasized - disable VAR and set switch to FLAT.

Step 3. With modulation per paragraph 2.1, adjust exciter IDC control for ± 5 kHz total deviation.

2.3 EXCITER AUDIO SENSITIVITY

Reduce the input level for 60% of rated deviation. Record the audio voltage at XCTR LEVEL jack on line driver module.

2.4 TRANSMIT LINE LEVEL

NOTE

If the station has a VAR module, it must be disabled and set to the flate mode.

Step 1a. Apply a 1 KHz test tone into the station on the 600 ohm line terminals and adjust the XCTR LEVEL control on the line driver module for ± 3 kHz deviation.

Step 1b. With the VAR option, and the same modulation as in Step 1a, adjust the XCTR LEVEL control on the VAR module for ± 3 KHz deviation, with the VAR module disabled and set to the PRE-EMPHASIZED mode.

Step 2. Re-enable VAR module when above adjustments are completed.

3. FREQUENCY SHIFT KEYING (FSK) DEVIATION

Step 1. Line disable the station via switch on station control module.

Step 2. Set the T.S.I. test switch to the TEST position, and place the DEVIATION switch to the + position. The binary deviation can be read as the output frequency (fo) minus the carrier frequency (fc).

Step 3. Adjust the + DEVIATION control on the digital modulator module until fo-fc equals +4.0 kHz.

Step 4. Place the DEVIATION switch to the -position and adjust the -DEVIATION control for fo-fc equals -4.0 kHz.

Step 5. Return the TEST switch to its normal position.



FUNCTIO U4 & ADD R21 (LINE DRIVER). The statio (TSI) OR R55 (LINE DRIVER). tone/funcod Ju2 (INTERCONNECT BRD). The guardiul is removed from interconnect transform module. Line PTT OLTAGE MODULE, REMOVE JUS & JUS tion contr, HZ VERIFICATION. dow, thus JUMPERED FOR: pass functon A line PT trol modu TO THE TSI MODULE. binary mo Transmitt The F1 Cd ground an these lines Channel eTS I MUST BE ADDED IN ORDER TO PROVIDE enable all keyed A-, A + is pre dow and b inging the After the millisecon Keyed A+ delayed ke millisecon during ton If the stat not preser modem to in the line carrier de module re considers

signal, it g

PTT funci quence to modem P' the line dr carrier. In

by modem

the binary to the dig

data and d

ducing the

(FSK-NRZ

SEC XMIT DATA

RELAY CLOSURE

RELAY CLOSURE

Station Block Diagram Motorola No. PEPS-34628-A 10/5/82 - V & G



trol module and prevents the station from entering the modulating the channel element. binary mode by removing the modem via relay K1 in the Transmitter Site Interface (TSI) module.

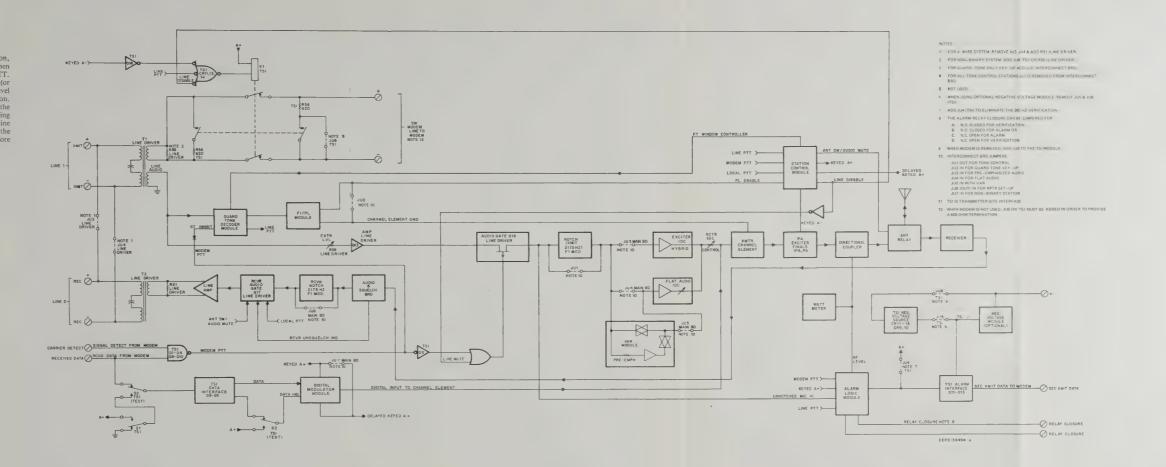
The F1 Control Module produces an F1 channel element ground and PL enable with the detection of 1950 Hz. these lines are latched until the station un-keys.

Channel element ground turns on the element and PL enable allows the station control module to generate keved A-, provided either keved A+ or delayed keved A + is present. Keyed A- closes the function tone window and biases the final rf stages in the transmitter br-

After the function tone there is a delay of 130-150 milliseconds, which allows for the loss of line PTT. Keved A + is removed by the loss of the PTT signal, but delayed keyed A + remains for an additional 160-200 milliseconds, preventing the station from un- keying during tone-binary or binary-tone transitions.

If the station is keyed while line PTT or line disable is not present, relay K1 in the TSI module allows the modem tones to be applied to the modem, again via T1 in the line driver module. The modern then generates carrier detect and received data signals. If the TSI module receives active data (active since the modem considers guard tone as static data) and a carrier detect signal, it generates a modem PTT function. The modem PTT function now replaces line PTT in the keying sequence to keep the station transmitter keyed. The modem PTT is used to open the transmit audio path in the line driver so the modem tones do not modulate the carrier. In addition, the guard tone decoder is disabled by modem PTT, therefore inhibiting line PTT while in the binary mode. The TSI module then passes the data to the digital modulator module which level shifts the data and dc couples it to the channel element, thus producing the frequency shift keying-non-return to zero (FSK-NRZ) output.

transmitted. The audio is routed from T1 in the line driver, through the notch filter and then to either the A line PTT produces keyed A+ from the station con-



Station Block Diagran Motorola No. PEPS-34628-4 10/5/82 - V & G

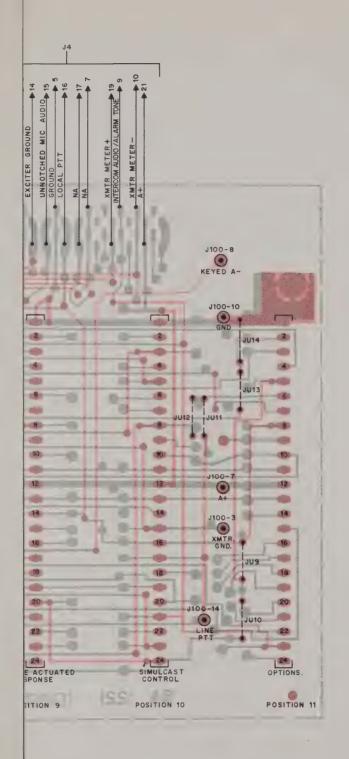
NA	^-	PL DISABLE	FLAT AUDIO CONTROL	PL DISABLE CONTROL	NA	NA	PL INPUT	AX	REFLECT POWER	NON-SIMUL FUNCT TONE WINDOW CONTROL
		23 [*]		20						17
				2						
				21						
									8	
	8*									
			7*							
					5	6	7	2		
	13				9	11		13		15
		13	26				29			
	6								14.5.5	
									J100 -13	

HOW TO READ CHART

- 1. This chart shows all interconnections made by the plating on both sides of the interconnect board and by wire jumpers.
- All pin numbers in each vertical column are electrically common (interconnected by circuit board plating).
- 3. To trace interconnections from any starting point to all other common points proceed as follows:
 - Step 1. Find the module position or connector in the left hand column of the chart.
 - Step 2. Find the desired pin number. All pins of a specific connector are listed in the line that extends to the right.
 - Step 3. Note the function of the desired pin. The function is listed at the top of the column in which the pin number appears. All other pins listed in the same function column are interconnected. For each entry in the function column, trace back to the left hand column to find the module or connector number. (See Example.)
 - Step 4. * equals function source.
 - Step 5. NA Not Assigned (Plating exists between points but not used.)

Example:

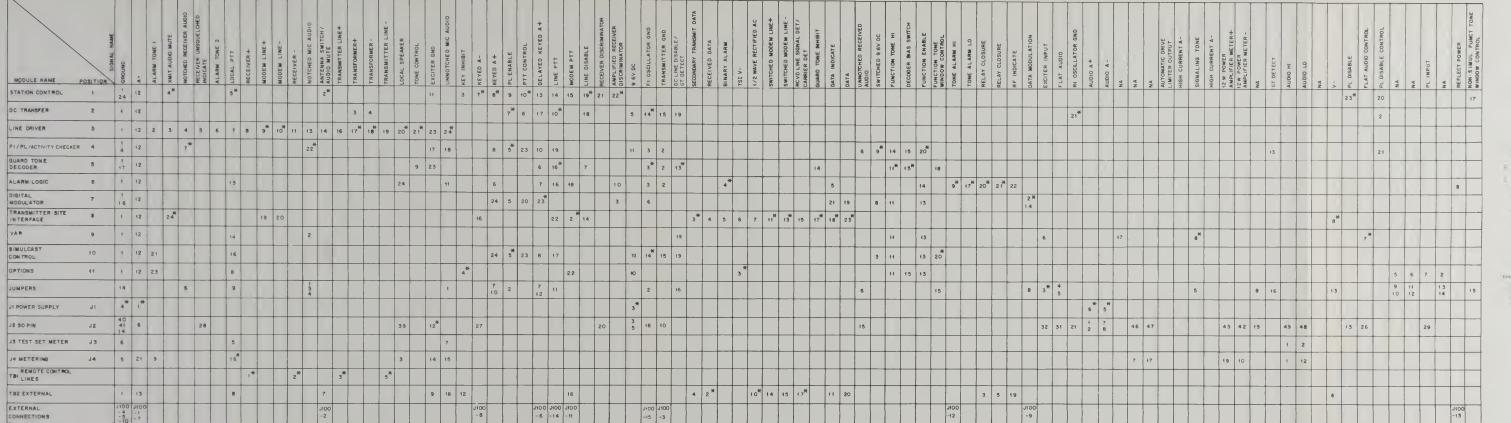
Station control module (position 1 pin 10) has a function of PTT Control which is interconnected to DC Transfer Module (position 2 pin 6), F1/PL Module (position 4 pin 23), Digital Modulator (position 7 pin 20), and Simulcast Control (position 10 pin 23).



NOTE: THESE CONNECTIONS ARE MADE ON NON-SYNTHESIZED STATIONS ONLY.

COMPONENT SIDE SD-EEPS-34456-A SOLDER SIDE BD-EEPS-34457-A OL-EEPS-34458-A

> TRN5349A Non-Unified Remote Control Board Circuit Board Detail & Parts List Motorola No. PEPS-34629-A 10/5/82 - V & G



EEP\$ - 35131 - A

HOW TO READ CHART

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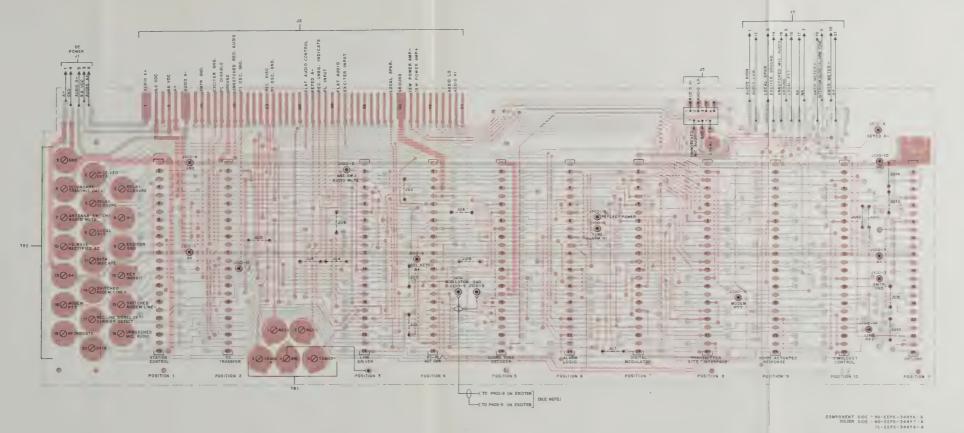
....

Static with impose postucing this are a series which is the work tool by Transfer Mind, e post in the P.M. die post in dark in Exit Minduality strengths.

TCN1383A Non-Unified Remote Control Chassis Interconnect Board for Link System Motorola No. EEPS-35131-A 9 29 82-V & G

parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION		
E1, 2, 3, 4	80-83029H01	spark, gap: 230 V - 15%		
J3	9-84207B01	connector, receptable: female: 7-ccntact		
	m	echanical parts		
	3-84482M01 29-83362G01 29-84028H01 39-10184A10 28-84269C01 28-84269C02	SCREW, may hine insulator, 25 used TERMINAL, 25 used TERMINAL, 18bg 264 used CONTACT, 4 ug. 13 used TERMINAL, contact, low profile, 13 used TERMINAL, contact, high profile; 10 used TERMINAL, contact, high profile; 10 used		



SHOWN FROM SOLDER SIDE (REAR OF STATION)

NOTE
THESE CONNECTIONS ARE
MADE ON NON-SYNTHESIZED
STATIONS ONLY

Board Circuit Board Detail & Parts List

Motorola No. PEPS-34629-A 10/5/82 - V & G



NOTES:

- 1. These connections are made on non-synthesized stations only.
- 2. CR1 and CR2 used with B84, C35, and C75 station models only.

Jumper Chart

Jumper	Normal	Description
JU1	OUT	IN To Remove Xmit Notch
JU2	OUT	IN For Guard Tone only or Modem Key-Up
JU3	IN	OUT For Non-Preemphasized Xmit Audio
JU4	OUT	IN For Non-Flat Audio
JU5	OUT	IN When Not Using VAR Module
JU6	OUT	IN To Remove Rovr Notch
JU7	OUT	IN For Non-Binary Paging Applications and
		Non-PL Link Applications

TRN4860A Unified Remote Control Board Circuit Board Detail & Parts List Motorola No. PEPS-34630-A 10/5/82 - V & G

HOW TO READ CHART

- This chart shows all interconnections made by the plating on both sides of the interconnect board and by wire jumpers.
- All pin numbers in each vertical column are electrically common (interconnected by circuit board plating).
- To trace interconnections from any starting point to all other common points proceed as follows:
- Step 1. Find the module position or connector in the left hand column of the chart.
- Step 2. Find the desired pin number. All pins of a specific connector are listed in the line that extends to the right.
- Step 3. Note the function of the desired pin. The function is listed at the top of the column: which the pin number appears. All other pins listed in the same function column are interconnected. For each entry in the function column, trace back to the left hand column to find the module or connector number. (See Example.)
- Step 4. equals function source.

Example:

Step 5. NA Not Assigned (Plating exists between points but not used.)

Station control module module position 2), pln 10 has a function of PTT Control, which is interconnected to DC Transfer Module (position 3) pin 8, F1/PL Module (position 5) pin 23, Digital Moduletor (position 8) pin 20, and Simulcast Control Module (position 9) pin 23.

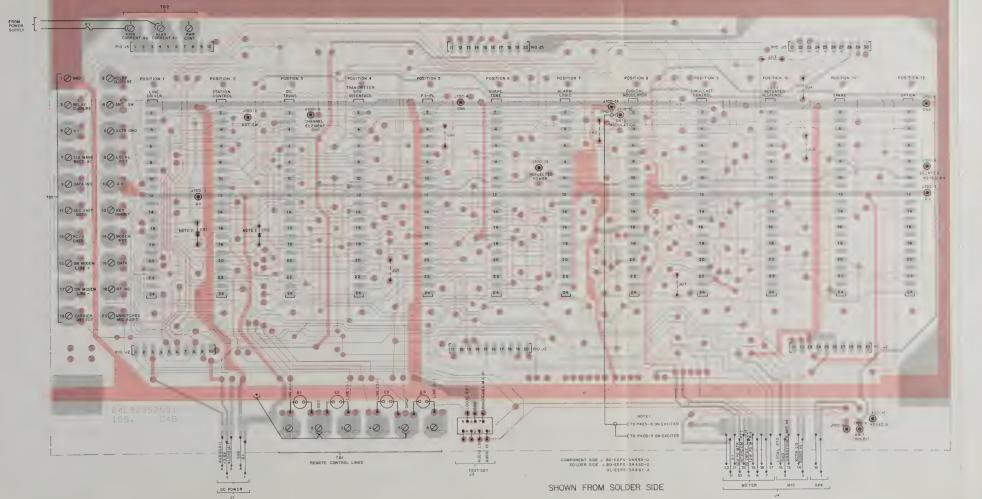
LINE DRIVER STATION CONTROL DC TRANSFER TRANSMITTER SITE GUARD TONE ALARM LOGIC DIGITAL MODULATOR SIMULCAST CONTROL JUMPERS J1 POWER SUPPLY J2 RECEIVER J3 TEST SET METER J4 METERING J5 XMTR TB1 REMOTE CONTROL LINES TB2 HIGH CURRENT TB3 EXTERNAL EXTERNAL CONNECTION POINTS EEPS-34873 - A

TCN1282A Unified Remote Control Chassis Interconnect Chart Motorola No. EEPS-34673-A 10/5/82 · V & G

-

RN4860A nterch	innect Board	PL 798
REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
		diode (see note)
CB1 2	48 83654H01	SHIEGO
		spark, gap
E1 2 1 4	80 83029H01	250 V + 15 c
		connector, receptacle
33	9 84207801	female 7-contact
	m	echanical parts
	3 84482M01	SCREW machine insulator 29 used
	29 B 1362G01	TERMINAL 29 USEJ
	29.84U28H09	TERMINA, plug 348 used
	39 10184A10	CONTACT (og 11 used
	28.84269001	TERMINAL ontail low profile 13 used
	28 64269C02	TERMINAL ontact high profile 10 used

note. For optimum performance dindes translators and integrated circuits multielingered by Mintorn a partinumbers.

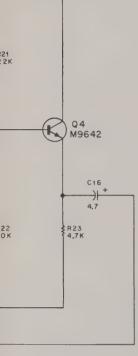


NOTES

- 1. These connections are made on non-synthesized stations only
- 2 CR1 and CR2, sed with B84 C35, and C75 statute models of

	Jumper Chart		
Jumper	Normal	Description	
JU1	OJT	N To Remove Xmit Notch	
JU2	OUT	N For Guard Tune only or Modern Key up	
JU3	IN	OUT For Non Preemphas zed Xm + Audio	
Jb4	OUT	IN For Nun Fiat Audio	
JU5	OUT	IN When Not Using vAR Module	
JU6	OUT	IN To Remove Row Natch	
JJ7	OUT	IN Fix Nijn Binary Paging Applications an	
		Non Pu Link Applications	

TRN4860A Unified Remote Control Board Circuit Board Detail & Parts List Motorola No. PEPS-34630-A 10/5/82 - V & G



DEPS-34495-0

parts list

TRN53484 Transmitter Flat Audio Board

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
		capacitor, fixed: uF ± 20%; 20 V;	
0.4		unless otherwise stated	
C1 ·	23-84538G02	4.7	
C2, 3	21-11015B13	.001 ± 10%; 100 V	
C4	8-84637L48	.068 ± 5%; 100 V	
C5	8-83813H14	.043 ± 5%; 50 V	
C6 C7	23-84538G02	4.7	
C8	23-11013C07	10 ± 10%; 15 V	
C9	23-84538G02 8-84326A25	4.7	
C10	8-84326A25	.0326 ± 2%; 50 V .0098 ± 2%; 50 V	
C11	8-84326A13	.0056 ± 2%; 50 V	
C12	8-84326A30	.0045 ± 1%; 50 V	
C13	23-84538G02	4.7	
C14	23-11013C07	10 ± 10%; 15 V	
C15, 16	23-84538G02	4.7	
C17	21-11015B13	.001 ± 10%; 100 V	
C18, 19	23-84538G02	4.7	
		transistor: (see note)	
Q1, 2, 3, 4	48-869642	NPN; type M9642	
		resistor, fixed: ±5%; 1/4 W;	
		unless otherwise stated	
R1	6-11009E91	56k	
R2	6-11009E81	22k	
R3	6-11009E55	1.8k	
R4, 5	6-11009E63	3.9k	
R6	6-11009E99	120k	
R7	6-11009E93	68k	
R8	6-11009E69	6.8k	
R9	6-11009E49	1k	
R10	6-11009E65	4.7k	
R11	6-11009E67	5.6k	
R12	6-11009E49 .	1k	
R13	6-11009E69	6.8k	
R14	6-11009E63	3.9k	
R15	6-11009E99	120k	
R16	6-11009E93	68k	
R17	6-11009E69	6.8k	
R18 R19	6-11009E41	470	
	6-11009E49	1k	
R20	6-11009E65	4.7k	
R21 R22	6-11009E81	22k	
	6-11009E73	10k	
R23 R24	6-11009E65	4.7k	
R25, 26	6-11009C51 6-11009E97	1.2k	
R27	6-11009E97	100k	
R28	18-83311K11	180k	
R29	6-11009C65	variable; 25k 4.7k	
	6-11009E01	10	
		integrated circuit: (see note)	
Ut ·	51-82884L14	quad analog switch; IC CMOS	
U2	1-80755D60	IDC hybrid	
	me	echanical part	

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

DIGITAL MODULATOR MODULE

MODEL TRN4856B

O-DEVIATION DIGITAL MODULATOR O+DEVIATION FRONT PANEL DETAIL

FUNCTION

This module accepts binary data from the Transmitter Site Interface (TSI) module and dc level shifts it to the proper voltages to deviate the transmitter carrier frequency ± 4 kHz corresponding to binary "1"s and "0"s.

The splatter filter attenuates high frequency energy from the binary data stream prior to application to the modulator. This limits the bandwidth of the transmitted signal per FCC regulations.

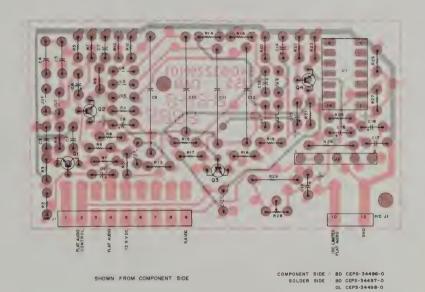
This module also provides gating of the binary data to the modulator stage in the transmitter, via the "Data Indicate" signal originating in the TSI module. The delayed keyed A+ from this module prevents the transmitter from un-keying during transitions between the normal mode and the binary mode of operation.

NOTES:

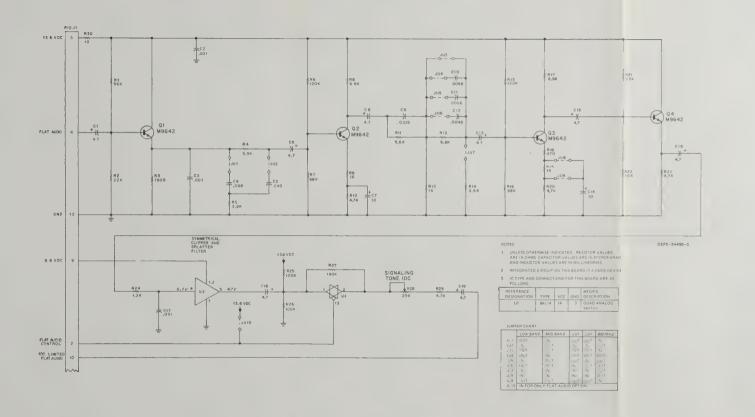
- Unless otherwise indicated: resistor values are in ohms; capacitor values are in microfarads.
- 2. Integrated circuits on this board are CMOS devices.
- 3. IC types and connections for this board are as follows:

Reference Designation	Туре	vcc	Gnd	Mfgr's Description
U1	29M08	4	11	Quad Op Amp
U2	84L14	14	7	Quad Analog Gate

TRN4856B Digital Modulator Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34632-A 10/5/82 - V & G







parts list

REFERENCE	MOTOROLA		
SYMBOL	PART NO.	DESCRIPTION	
		capacitor, fixed uF ± 20% 20 V	
		in ess, there se stated	
C1	23-84538G02		
	21 11015813	.001 ± 10° 0 10	
4	8-84637L48	(2	
	* 202/2007		
	15 1 2		
in a	* - * -		
	and the p		
		796-000-0	
	N 42 , 10	The state of the s	
-	* * * * * * * * * * * * * * * * * * *	and the second s	
		4	
- 1	Terronder.		
c +>	100		
	121		
- 14	45 5 7 7		
04.00.4	48-869642	transistor (see note	
D1 2, 3, 4	48-869642	NPN, type M964;	
		resistor fixed ±5 14 W	
4.4	n	Tito.	
	40.00		
	F 10 5 6		
H4 :	. 25.5		
	• 46 × 4		
	. 45 4		
		100	
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a. f		A STATE OF THE STA	
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	F (£ 21)		
part a	b. 10 gr		
Acc.	r 1 0 65	4.75	
A.	. 41 1		
2	F 22 0 2	1796	
1,	6 11009E65	4.75	
	6 11009C51	1.2>	
ing - co	6 11009E97	100>	
	6 11009D04	180)	
m_r	× 3311K11	variable 25)	
m	n 1 e n1	4.79	
Fi si	6 11009E01	10	
		integraled circuit (see note,	
. *	32884L14	quadianality switch IC CMCS	
ns.	1-80755060		
	m	echanical part	
	3-83697M01	RECEPTAC	01 11 3

be ordered by Molarola parl numbers

UNUSED CIRCUIT

DIGITAL MODULATOR MODULE

MODEL TRN4856B

FUNCTION



This module accepts binary data from the Transmitter Site Interface (TSI) module and dc level shifts it to the proper voltages to deviate the transmitter carrier frequency ±4 kHz corresponding to binary "I"s and "0"s.

The splatter filter attenuates high frequency c erest from the binary data stream prior to application to the modulator. This limits the bandwidth of the transmitted signal per FCC regulations.

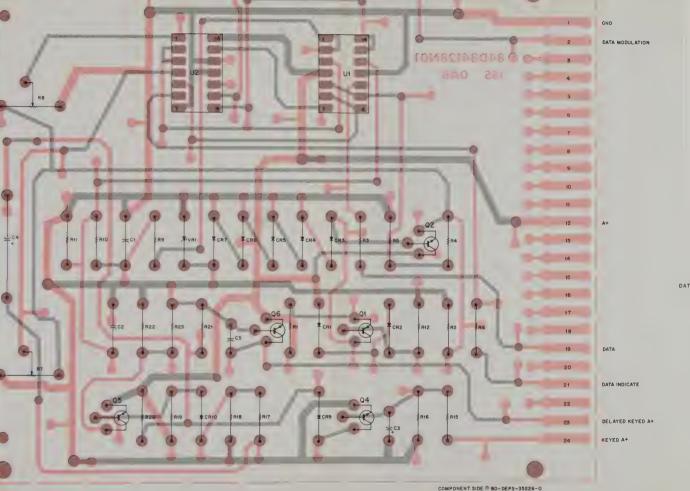
This module also provides gating of the binary data to the modulator stage in the transmitter, via the "Data Indicate" signal originating in the TSI module. The delayed keyed A+ from this module prevents the transmitter from un-keying during transitions between the normal mode and the binary mode of operation.

NOTES

- 1 Unless otherwise indicated resistor values are in ohms, capacitor values are in microfarads.
- 2 Integrated circuits on this board are CMOS devices
- 3 IC types and connections for this board are as follows

Reterence Designation	Туре	VCC	Gnd	Migr's Description
U1	29M08	4	11	Quad Op Amp
***			-	

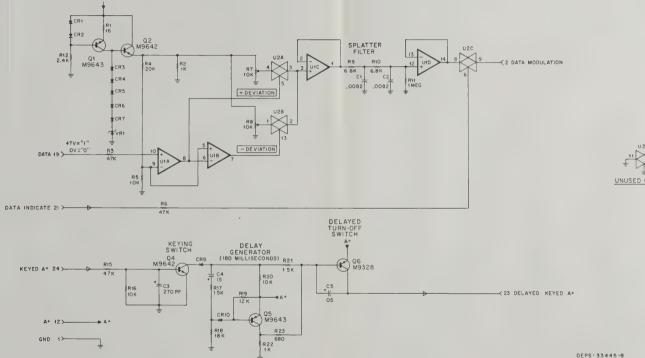
TRN4856B Digital Modulator Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34632-A 10/5/82 - V & G



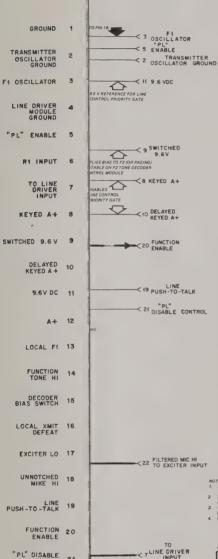
SHOWN FROM COMPONENT SIDE

SOLDER SIDE BD-DEPS-35227-0

OL-DEPS-35228-0







MIKE HI 22

24

P-T-T CONTROL 23

FUNCTION

TLN4658A F1 Control	Keys XMTR on F1.		
TLN4638A F1-PL Control	Keys XMTR on F1 and PL disables RCVR.		
TLN5293A F1 Control (4-Freq. Carrier Squelch Station)	Provides receive and transmit notch filters. Frequency selected on separate 4-Freq. control module (TLN5292A).		
TLN5294A F1-PL Control (4-Freq. PL Squelch Station)	Provides receive and transmit notch filters and PL disables RCVR. Frequency selected on separate 4-Freq. control module (TLN5292A)		

NOTES.

1. JUS IS REMOVED WHEN MULTI-FREQUENCY AND PAGING
TRANSMITTERS ARE USED
2. TUNED CINCUTS CONT.
2. TOROUGH CHILD CONT.
3. VOLTAGES SHOWN IN PARRENTESS ARE NORMALLY MEASURED
WHEN FUNCTION SEATURED.
4. UNLESS CHERNISE STATED
WHEN FUNCTION SEATURED.
5. CAPACITOR VALUES ARE IN WICROFARADS.
CAPACITOR VALUES ARE IN WICROFARADS.

TO

LEGEND.

TO

LEGEND.

TO

TO

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THEORY OF OPERATION DATA

- MAINTENANCE DATA

- PRIMARY SIGNAL FLOW

- SECONDARY SIGNAL FLOW

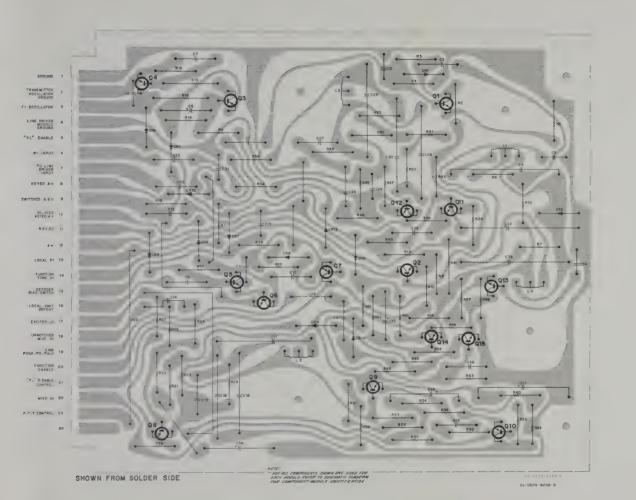
4. LINE DRIVER MODULE
GROUND.

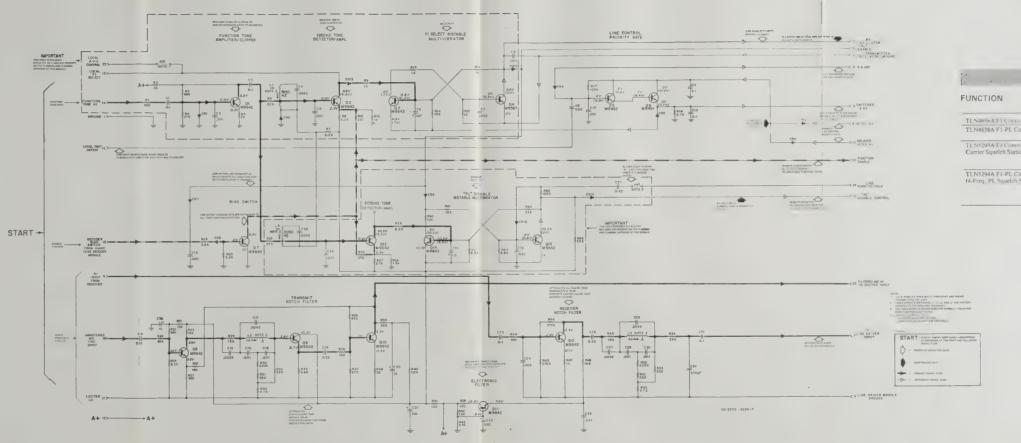
PARTS LIST SHOWN ON BACK OF THIS PAGE 68P81016E19-N

parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION		
STMBUL	PART NO.			
		capacitor, fixed: uF;		
		unless otherwise stated		
C1, 2	8-83813H30	.0082 ± 10%; 100 V		
C3	21-82187B22	270 pF ± 10%; 200 V		
C4	23-82783B24	15 ± 15%; 25 V		
C5	21-82372C04	.05 + 80-20%; 25 V		
		diode: (see note)		
CR1 thru 10	48-83654H01	silicon		
		transistor (see note)		
Q1	48-869643	PNP; type M9643		
Q2	48-869642	NPN: type M9642		
Q4	48-869642	NPN; type M9642		
Q5	48-869643	PNP; type M9643		
Q6	48-869328	NPN; type M9328		
		resistor, fixed: ±5%; 1/4 W;		
		unless otherwise stated		
R1	6-11009C06	16		
R2	6-11009C49	1k		
R3.6	6-11009C89	47k		
R4	6-11009C80	20k		
R5	6-11009C73	10k		
	18-84143N01	variable; 10k		
R7, 8				
R9, 10	6-11009C69	6.8k		
R11	6-11009D22	1 meg.		
R12	6-11009C58	2.4k		
R15	6-11009C65	4.7k		
R16	6-11009C73	10k		
R17	6-11009C53	1.5k		
R18	6-11009C79	18k		
R19	6-11009C75	12k		
R20	6-11009C73	10k		
R21	6-11009C53	1.5k		
R22	6-11009C49	1k		
R23	6-11009C45	680		
		integrated circuit: (see note)		
U1	51-83629M08	quad operational amplifier		
U2	51-82884L14	quad analog gate		
		voltage regulator:		
VR1	48-82256C44	Zener type; 7.5 V		
		echanical parts		
	3-125790	SCREW, machine: 4-40 x 5/16"; 2 used		
	45-83914G01	CARD, guide; 2 used		
	46-84703E01	GUIDE, circuit board		
	64-83163L13	PANEL, screened		
	9-83697M01	RECEPTACLE, female; 24 used		
	43-865080	BUSHING; 2 used		

PANEL, screened
RECEPTACLE, female; 24 used
BUSHING; 2 used **note:** For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

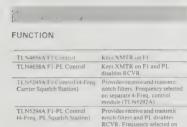




F1 & F1-PL TONE DECODER MODULES

MODELS TLN4638A F1-PL TLN4658A F1 TLN5293A F1 (4F) TLN5294A F1-PL (4F)

separate 4-Freq control module



PARTS LIST SHOWN ON BACK GOF THIS PAGE
68P81016E19-N
10/5/82 - V & G





parts list

TLN4658A F1 Control Module
TLN4638A F1 Private-Line Control Module
TLN5293A F1 Control Module
TLN5293A F1 Control Module

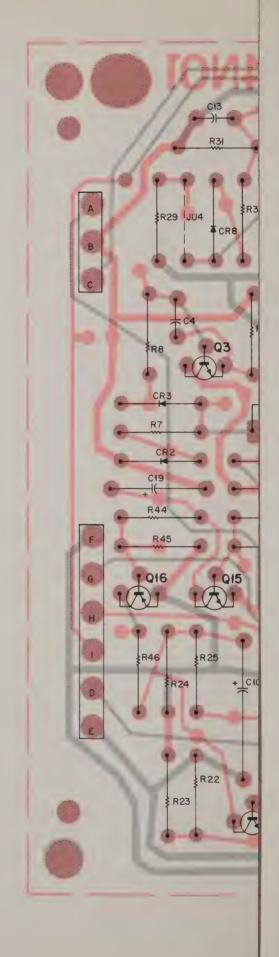
PI -1709.G

REFERENCE	MOTOROLA	
SYMBOL	PART NO.	DESCRIPTION Capacitor fixed: uE + 10%: 50 V
		capacitor, fixed: uF ± 10%; 50 V unless otherwise stated:
C1 C2	8-82905G07	0.1 .001: 100 V
C3	21-82187B29 8-82905G07	.001; 100 V 0.
C4	8-84326A14	.006 ± 2%
C5 C6	21-82187B29 23-82783B08	.001; 100 V
C7	8-82905G02	1 ± 20%; 35 V .022
C8 ·	21-82187B29	.001; 100 V
C9 C10	8-82905G11 21-82187B29	0.22 .001; 100 V
C11, 12	8-82905G07	0.1
C13, 14	21-82187B29	.001; 100 V
C15 C16	8-82905G25 8-82284C01	.0033 .001
C17	8-84326A30	.0045 ± 1%
C18	8-82284C01	.001
C19 C20	8-82905G11 23-865136	0.22 15 ± 20%; 25 V
C21	23-84669A19	100 + 150-10%; 20 V
C22	23-82601A25	100 + 150-10%; 20 V
C23 C24	8-82905G07 21-82187B27	0.1 .002; 100 V
C25	8-82905G03	.047
C26	8-82905G11	0.22
C27 C28	8-82905G25 8-82284C01	.0033 .001
C29	8-84326A30	.0045 ± 1%
C30 C31	8-82284C01	.001
C32	21-82187B22 8-82905G07	270 pF; 200 V 0.1
C33	8-84326A13	.0056 ± 2%
C34 C35	21-82187B29	.001; 100 V
C36	23-82783B08 8-82905G02	1 ± 20%; 35 V .022
C37	8-82905G11	0.22
C38	23-865136	15 ± 20%; 25 V
		semiconductor device, diode (see note)
CR1 thru 13	48-83654H01	silicon
		reactor:
L1 thru 4	1V80702B11	(factory-adjusted) res. 40 ohms
		± 10%; includes grounding clip
		transistor: (see note)
Q1, 2	48-869642	NPN; type M9642
Q3	48-869643	PNP; type M9643
Q4 Q5	48-869567 48-869642	NPN; type M9567 NPN; type M9642
Q6	48-869491	NPN; type M9491
Q7, 8, 9, 10, 11,	40.000040	NIPNI: 6: 140040
12, 13 Q14	48-869642 48-869643	NPN; type M9642 PNP; type M9643
Q15	48-869642	NPN; type M9642
		resistor, fixed; ± 5%; 1/4 W; unless otherwise stated:
R1	6-11009C43	560
R2	6-11009C49	1k
R3 R4	6-11009C93 6-11009C83	68k 27k
R5, 6	6-11009C81	22k
R7, 8	6-11009C57	2.2k
R9 R10	6-11009C49 6-11009C33	1k 220
R11		NOTUSED
R12	6-11009C49	1k
R13 R14	6-124A49 6-11009C73	1k; 1/2 W 10k
R15	6-11009C49	1k
R16	6-124A49	1k; 1/2 W
R17 R18	6-11009C97 6-11009C59	100k 2.7k
R19	6-11009C63	3.9k
R20 R21	6-11009C57	2.2k
R22	6-11009C79 6-11009C91	18k 56k
R23	6-11009C73	10k
R24	6-11009C95	82k 8.2k
R25 R26	6-11009C71 6-11009C79	18k
R27	6-11009C43	560
R28	6-11009C41	470
R29 R30	6-11009C77 6-11009D06	15k 220k
R31	6-11009C85	33k
R32 R33	6-11009C65	4.7k 33k
R34	6-11009C85 6-11009C67	5.6k
R35	6-11009C73	10k
R36	6-11009C95	82k

	RENCE	MOTOROLA PART NO.	, DES	CRIPTION
R37		6-11009C83	27k	
R38		6-11009C19	56	
R39		6-11009C43	560	
R40		6-11009C51	1.2k	
R41		6-124A25	100; 1/2 W	
R42		6-11009C53	1.5k	
R43		6-11009C59	2.7k	
R44		6-11009C73	10k	
R45		6-11009D08	270k	
R46		6-124B08	270k ±5%	
R47		6-11009C49	1k	
R48		6-11009C73	10k	
R49		6-11009C77	15k	
R50		6-11009D06	220k	
R51		6-11009C85	33k	
R52		6-11009C65	4.7k	
R53		6-11009C85	33k	
R54		6-11009C87	39k	
R55		6-11009C83	27k	
R56		6-11009C35	270	
R57		6-11009C59	2.7k	
R58		6-11009C53	1.5k	
R59		6-11009C57	2.2k	
R60, 61		6-11009C73	10k	
R62, 63		6-11009C69	6.8k	
R64		6-11009C81	22k	
R65		6-11009C97	100k	
R66		6-11009C81	22k	

note: Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.





TRN4853A Transmitter Site Interface Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34633-A (Sheet 1 of 2) 10/5/82 - V & G

TRANSMITTER SITE INTERFACE MODULI

TRANSMITTER SITE INTERFACE MODULE (TSI)

MODEL TRN4853A

istor values are in ohms and capacitor values

in the following chart.

rmal Usage

tect key-up) data) data) on)

ve voltage module is used) n is removed)

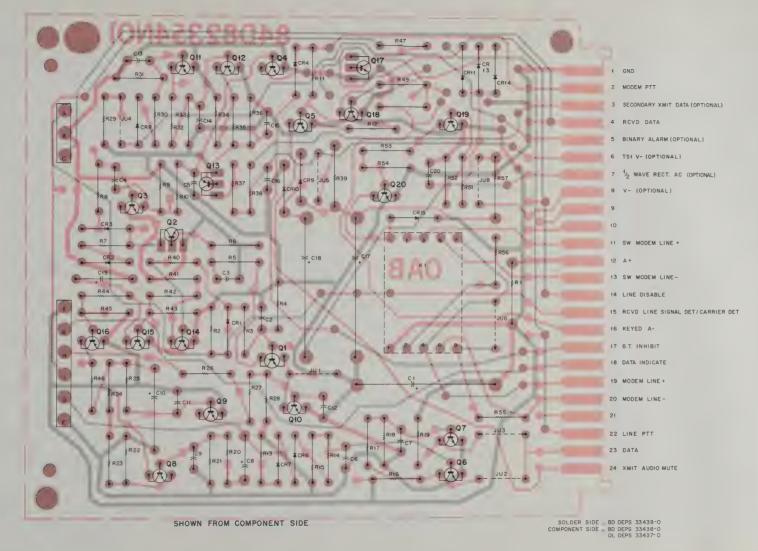
ve voltage module is used)

FUNCTION

This module accepts binary data from the modem and dc level shifts it to the proper logic levels required by the digital modulator module for binary paging. The T.S.I. module provides a modem PTT function in conjunction with the carrier detect signal and the binary output data from the modem. The modem PTT function is used to key the station in the binary mode of operation. The modem PTT signal is also used to inhibit the guard tone decoder allowing the station to go into the FSK-NRZ (frequency shift keying - non return to zero) mode required for binary signaling.

A relay and associated driver control circuitry are contained in this module to switch the modem off line until the station has received the proper tone remote signaling commands. This prevents modem falsing and subsequent transmitter key up falsing due to telephone line or radio link noise. It also prevents the modem from being on the line during line PTT.

TRN4853A Transmitter Site Interface Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34633-A (Sheet 2 of 2) 10/5/82 - V & G



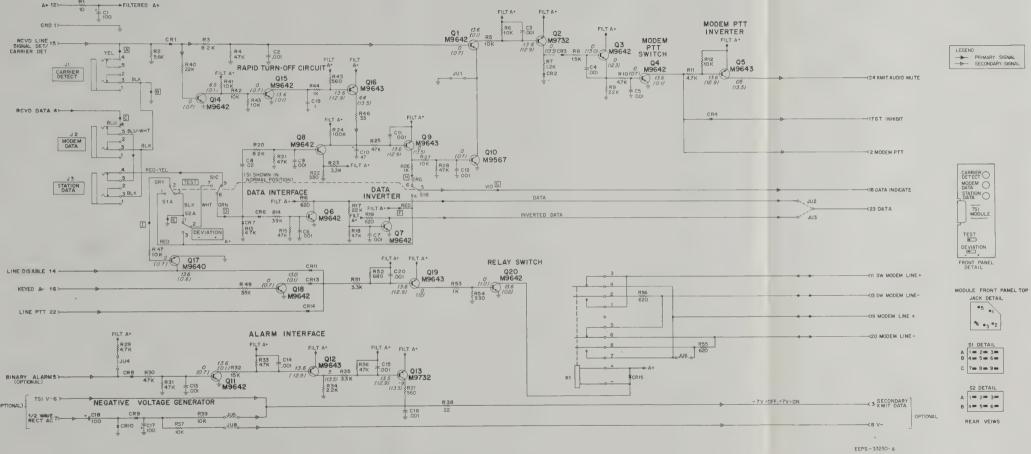
TRN4853A Transmitter Site Interface Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34633-A (Sheet 1 of 2) 1015/82 - V & G

parts list

	mitter Site Interfa	ce Module		PL-7685
REFERENCE	MOTOROLA PART NO.		DESCRIPTION	
	7211110.		xed: uF ± 10%; 100 V;	
		unless other	wise stated	
C1 C2 thru 5	23-82601A25 21-11015D13	100 + 150 10	1%; 20 V	
C6.7	21-11015B13	.001		
C8	8-82905G23	.02		
C9	21-11015B13	.001		
C10 C11 thru 16	23-82783B37 21-11015B13	47 ± 20% 25	5 V	
C17, 18	23-82077G01	100 + 150-10	%-35 V	
C19	23-84762H06	1.0 ± 20%.3	5 V	
C20	21-11015B13	.001		
		diade: (see n	ote)	
CR1 thru 4	48-83654H01	silicon		
CR5 thru 8 CR9, 10	48-83654H01 48-82466H13	silicon		
CR11	48-83654H01	silicon		
CR13, 14, 15	48-83654H01	silicon		
		connector, re	eceptacle:	
J1, 2, 3	9-83073L02	Jack, phone		
		relay reed		
K1	80-82617M06	13.4 V; coli re	es. 240 ohms ± 10%	
		transistor (s	ee note)	
Q1	48-869642	NPN; type M	9642	
Q2	48-869732	PNP; type M:	9732	
Q3, 4	48869642	NPN; type M	9642	
Q5 Q6, 7, 8	48-869643 48-869642	PNP; type M NPN; type M	9643	
Q9,7,8	48-869643	PNP; type M	9643	
Q10	48-869567	NPN; type M	9567	
Q11	48-869642	NPN; type M	9642	
Q12	48-869643	PNP; type M	9643	
Q13 Q14, 15	48-869732 48-869642	PNP; type M:	9632	
Q16	48-869643	NPN; type M: PNP; type M:	9643	
Q17	48-869640	NPN-tune M	9640	
Q18	48-869642	NPN; type M PNP; type M	9642	
Q19 Q20	48-869643 48-869642	NPN; type M	9642	
		unless other	d: ±5%; 1/4 W;	
R1	6-125C01	10 ± 10%; 1/	2 W	
R2	6-11009C67	5.6k		
R3	6-11009C71	8.2k		
R4 R5, 6	6-11009C89 6-11009C73	47k 10k		
H5, 6 R7	6-11009C73 6-11009C51	1.2k		
R8	6-11009C77	15k		
R9	6-11009C81	22k		
R10, 11	6-11009C65	4.7k		
R12 R13	6-11009C73 6-11009C85	10k 4.7k		
R14	6-11009C63	3.9k		
R15	6-11009C89	47k		
R16	6-11009C44	620		
R17	6-11009CB1	22k		
R18 R19	6-11009C89 6-11009C44	47k 620		
R20	6-11009C44	8.2k		
R21	6-11009C89	47k		
R22	6-11009C37	330		
R23 R24	6-11009C61 6-11009C97	3.3k 100k		
H24 R25	6-11009C97 6-11009C89	100k 47k		
R26	6-11009C49	1k		
R27	6-11009C73	10k		
R28	6-11009C89	47k		
R29 R30, 31	6-11009C65 6-11009C89	4.7k 47k		
H3U, 31 R32	6-11009C89 6-11009C77	47K 15k		
R33	6-11009C89	47k		
R34	6-11009C57	2.2k		
R35	6-11009C61	3.3k		
R36 R37	6-11009C89 6-11009C43	47k 560		
H37 H38	6-11009C43 6-11009C09	22		
R39	6-125A73	10k; 1/2 W		
R40	6-11009C81	22k		
R41 thru 43	6-11009C73 6-11009C49	10k 1k		
R45		560		
R46	6-11009C43 6-11009C13	33		
R47	6-11009C73	10k		
R48	0.44000000	NOTUSED		
R49 R51	6-11009C85 6-11009C61	33k 3.3k		
H51 R52	6-11009C61 6-11009C45	3.3K 680		
R53	6-11009C49	1k		
R54	6-11009C37	330		
R55, 56	6-11009C44	620		
B57	6-125A73	10k; 1/2 W		

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
S1	40 83204B03	switch, slide: 3 pd1
\$2	40-83204B01	dpdt
	3-125790 45-83914G01	SCREW, machine: 4-40 x 5/16"; 2 used GUIDE, card, 2 used
	46-84703E01 1-80761D46	QUIDE, circuit board PANEL, riveted (includes ref. item S1, S2)
	9-83697M01	RECEPTACLE, board mounting; 24 used

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers



--- PRIMARY SIGNAL -- SECONDARY SIGNAL

NOTES

- 1. Unless specified otherwise, resistor values are in ohms and capacitor values
- 2. Jumper configurations are given in the following chart



FUNCTION

This module accepts binary data from the modem and de level shifts it to the proper logic levels required by the digital modulator module for binary paging. The T.S.I. module provides a modem PTT function in conjunction with the carrier detect signal and the binary output data from the modem. The modem PTT function is used to key the station in the binary mode of operation. The modem PTT signal is also used to inhibit the guard tone decoder allowing the station to go into the FSK-NRZ (frequency shift keying - non return to zero) mode required for binary signaling.

A relay and associated driver control circuitry are contained in this module to switch the modem off line until the station has received the proper tone remote signaling commands. This prevents modem falsing and subsequent transmitter key up falsing due to telephone line or radio link noise. It also prevents the modem from being on the line during line PTT.

> TRN4853A Transmitter Site Interface Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34633-A (Sheet 2 of 2) 10/5/82 - V & G

DESCRIPTION

150k 10k 4.7k

switch, slide: dpdt

ransformer, line driver: bins #7 and 9 dc resist. = 110 ohms bins #1 and 2 dc resist. = 25 ohms bins #3 and 4 dc resist. = 25 ohms bins #11 and 12 dc resist. = 250 ohms bins #7 and 9 dc resist. = 250 ohms bins #3 and 4 dc resist. = 25 ohms bins #3 and 4 dc resist. = 25 ohms bins #1 and 12 dc resist. = 25 ohms bins #11 and 12 dc resist. = 250 ohms cins #11 and 12 dc resist. = 250 ohms lerenced items CIRCUIT BOARD ncludes: RECEPTACLE, board mounting; 24 used BUSHING, threaded; 2 used PANEL, riveted ncludes: ref. items \$1 PANEL WASHER, insulated 3CREW, tapping; 4-40 x 5/16"; 2 used 3CREW, tapping; 4-40 x 5/16"; 2 used 3RACKET, panel STRAP, tie; 3 used CARD, guide; 2 used 3UIDE, circuit board des, transistors, and integrated circuits must

LINE DRIVER MODULE

MODEL TRN4859A

sistor values are in ohms and capacitor values

) indicate signal input levels for ac voltage (V ses, the signal generator is set to the level in-

n in the following chart:

l; out for 4-wire control.

special applications.
special applications.
special applications.
RCVR line levels <- 10 dBm.

ed in binary stations.

uard tone filters when injecting a 1 V rms signal ment.

D STA T DRCVR D LINE O STA D XMTR D LINE ER XMTR DR

FUNCTION

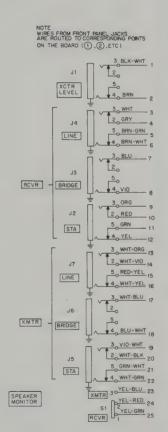
This module amplifies and gates incoming 600-ohm line audio to the transmitter. It also routes incoming modem tones for binary paging applications to the modem via a relay in the transmitter site interface module (TSI). The line driver also receives audio from an optional monitor or link receiver, gates and amplifies it so it is capable of driving a 600-ohm telephone line.

When the station has local speaker monitoring capability, a front panel mounted switch on the line driver selects either received or transmit audio which is routed to the local speaker. An amplifier circuit is located in both receive and transmit audio paths to drive the local speaker final amplifier circuits.

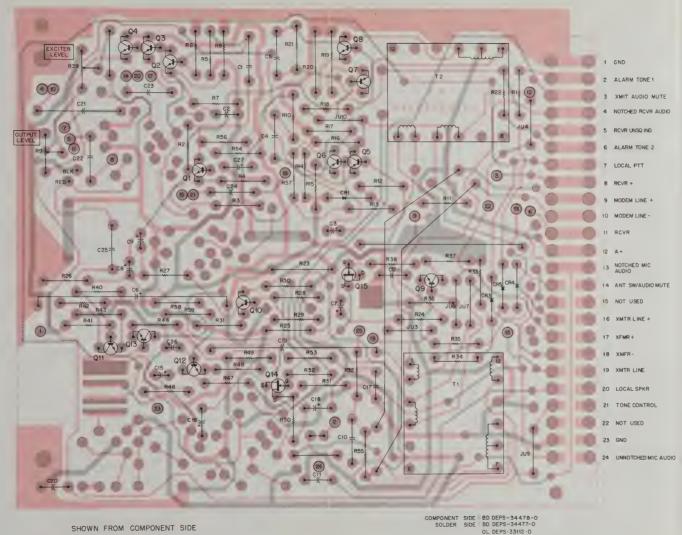
The test jacks located on the front panel facilitate level settings. Three jacks are for receiver line audio measurements and an additional set of three jacks are for transmit line audio measurements. One bridging and two terminating jacks are provided in each set of three jacks mentioned above. An additional test jack labeled XCTR LEVEL is provided for injecting a test tone directly into the exciter audio circuitry for Instantaneous Deviation Control (IDC) setting.

Jumpers in the module provide for either a 4-wire configuration (receive audio on a separate phone line from transmit audio) or a 2-wire configuration (receive and transmit audio combined on the same telephone line).

TRN4859A Line Driver Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34634-A (Sheet 2 of 2) 10/5/82 - V & G



TRN4859A Line Driver Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34634-A (Sheet 1 of 2) 1015/82 - V & G



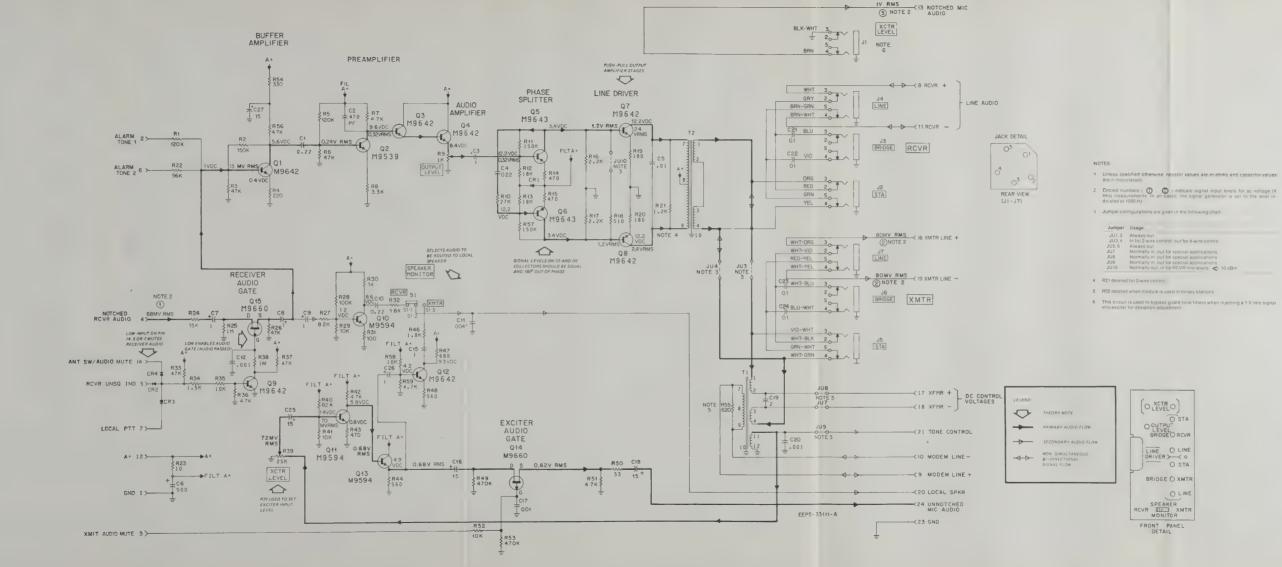
parts list

RN4859A Line Di		Pt 764
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed, uF ± 10%, 50 V
		unless otherwise stated
C1 C2	8-82905G11 21-82187B07	0 22
C2 C3	23-84538G01	470 pF 500 V 1.0 - 20% 35V
C4	8-82905G11	0.22
C5	8-82905G01	01
C6	23-83210A19	500 20 V
C7. B. 9	23-84538G01	10 - 20 V
C10	8,82905G11	10 - 20%. 35 V 022
C11	21-82428B27	
C11 C12	21-82187B20	001, 100 V NOT USED 1 0 - 20% 35 V 15 - 20% 20 V
C13.14		NOT USED
C15	23-84538G01	10 - 20% 35 V
C16	23-84538C04	15 - 20° o 20 V
C17	21-82187B20	001, 100 V 15 - 20° 0 20 V
C18	23-84538G04	15 - 20° o 20 V
C19	8-863305	2.0: 200 V
C20	21-82187B20	001 100 V
C21	8-82317B01	0 1, 100 V
C22 23 24 C25	21-82372C01 23-84538G04	0.1
C26	23-84538G04 23-84538G01	15 ± 20° 0 20 V 1.035 V 15 - 20%, 20 V
C27	23-84538G04	1.035 V
UEI	23.04330004	13 - 20 %, 20 9
		diode. (see note)
CR1 thru 4	48-83654H01	silicon
		connector, receptacle:
J1 thru 7	9-83073L02	phono
		transistor: (see note)
Q1	48-869642	NPN, type M9642
Q2	48-869539	NPN. type M9642 NPN, type M9539
Q3, 4	48-869642	NPN, type M9642 PNP; type M9643
Q5, 6	48-869643	PNP; type M9643
Q7. 8. 9	48-869642 48-869594	NPN, type M9642
	48-869642	NPN, type M9594 NPN; type M9642
	48-869594	NPN. type M9594
Q14, 15	48-869660	FET, type M9660
		resistor, fixed: +5%; 1/4 W
		unless otherwise stated
R1	6-11009C99	120k
R2	6-11009D02	150k
R3	6-11009C89	47k
R4 R5	6-11009C33 6-11009C99 6-11009C89	220 120k
R6	6-11009099	12UK 47k
R7	6-11009C65	4.7k
R8	6-11009C61	3.3k
R9	18-83083G09	var 1k
R10	6-11009C83	27k
R11	6-11009D02	150k
R12, 13	6-11009C79 6-11009C41 6-11009C57	18k
R14, 15 R16, 17	6-11009C41	470
R16, 17	6-11009C57	2.2k
R18	6-11009C42	510
R19 20	6-125A31	180, 1/2 W
R21 R22	6-11009C51 6-11009C91	1.2k 56k
	6.125 4 0 1	56k 10. 1/2 W
R24	6/11009077	10. 1/2 W 15k
R25	6-11009D22	1.0 meg
R26	6-11009D22 6-11009C89 6-11009C71	47k
R27	6-11009C71	8 2 k
R28	6-11009C97	100k
R29	6-11009C73	10k
R30	6-11009C49	1k
R31	6-11009C25	100
R32	6-11009C55	1 8k
R33	6-11009C81	47k
R34 R35	6-11009C53	1.5k 10k
R35 R36	6-11009C65	10k 4.7k
H36 B37	6-11009C65 6-11009C81	4,7k 47k
H37	6-11009D81 6-11009D22	10 meg
R39	18-83083G16	var 25k
R40	6-11009C95	82k
R41	6-11009C73	10k
R42	6-11009C65	4 7k
	6-11009C41	470
R44	6-11009C41 6-11009C43	560
R45		NOTUSED
R46	6-11009C55	1.8k
R47	6-11009C45	680
R48	6-11009C43	560
R49	6-11009D14	470k
R50	6-11009C13 6-11009C65	33
	6-11009C65	4.7k 10k
R51		
R52	6-11009C73	
R52 R53	6-11009C73 6-11009D14	470k
R52 R53 R54	6-11009C73 6-11009D14 6-11009C37 6-11009C44	

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
R57	6-11009D02	
R58	6-11009C73	
R59	6-11009C65	
		switch, slide
S1	40-83204801	dr dt
		transformer, line driver
T1	25-83036L02	pins #7 and 9 dc resist = 110 ohms
		pins #1 and 2 do resist = 25 ohms
		pins #3 and 4 dc resist = 25 ohms
		pins #11 and 12 dc resist = 250 ohms
T2	25 83036L01	pins #7 and 9 dc resist 250 ohms
		pins #1 and 2 dc resist - 25 ohms
		pins #3 and 4 dc resist 25 ohms
		tins #11 and 12 dc resist 250 ohms
	non-	referenced items
	1 80761D42	C ROUIT BOARD
		I udes
	9 83697M01	RECEPTACLE board mounting 24 used
	43 865080	BUSHING threaded, 2 used
	1 80761D40	PANEL, riveted
		r cudes ref. items \$1
	64-83163L09	PANEL
	4-82418B97	NASHER insulated
	3-134184	SCREW tapping 4-40 x 5/16 2 used
	3-125790	SCREW tapping, 4-40 x 5/16", 2 used
	7 83164L01	BRACKET panel
	42 10217A02	STRAP Ne 3 used
	45-83914G01	CARD guide 2 used
	46-84703E01	GUIDE, circuit board

note: For optimum performance, dio less transistors, and integrated circuits must be ordered by Motorola part numbers.

MODEL TRN4859A



FUNCTION

This module amplifies and gates incoming 600-ohm line audio to the transmitter. It also routes incoming modem tones for binary paging applications to the modem via a relay in the transmitter site interface module (TSI). The line driver also receives audio from an optional monitor or link receiver, gates and amplifies it so it is capable of driving a 600-ohm telephone line.

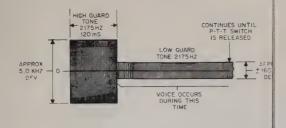
When the station has local speaker monitoring capability, a front panel mounted switch on the line driver selects either received or transmit audio which is routed to the local speaker. An amplifier circuit is located in both receive and transmit audio paths to drive the local speaker final amplifier circuits.

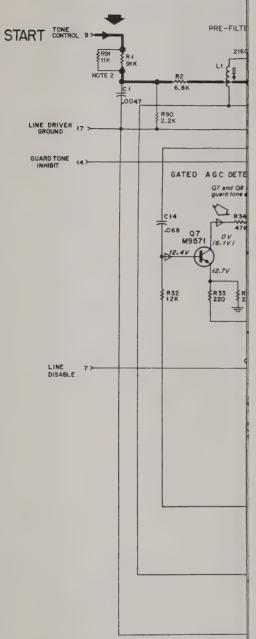
The test jacks located on the front panel facilitate level settings. Three jacks are for receiver line audio measurements and an additional set of three jacks are for transmit line audio measurements. One bridging and two terminating jacks are provided in each set of three jacks mentioned above. An additional test jack labeled XCTR LEVEL is provided for injecting a test tone directly into the exciter audio circuitry for Instantaneous Deviation Control (IDC) setting.

Jumpers in the module provide for either a 4-wire configuration (receive audio on a separate phone line from transmit audio) or a 2-wire configuration (receive and transmit audio combined on the same telephone line).

> TRN4859A Line Driver Module Circuit Board Detail. Schematic Diagram & Parts List Motorola No. PEPS-34634-A (Sheet 2 of 2) 1015182 - V & G







FUNCTION TONE 18 >

GUARD TONE DECODER MODULE

MODEL TLN2376A

FUNCTION

This module detects 2175 Hz guard tone and converts it into line PTT signal which is required for remote key up of the transmitter. It also amplifies received function tones and distributes them to other function tone decoders in the station (for example the 1950 Hz tone detector in the F1 Control Module).

The automatic gain control circuitry in this module adjusts guard tone and function tone levels for proper operation of tone decoding circuitry independent of input levels to the remote control chassis of the station.

The activity detector stages sense the loss of low level guard tone. The fast turn off circuitry quickly turns off the line PTT signal so the station can rapidly enter the binary mode of operation or un-key the transmitter depending on the commands sent to the station.

This module also has a switchable bandpass filter to allow only the guard tone frequency to enter the module to provide falsing protection. After detection of guard tone, this filter is switched out during the time function commands are sent to the station and during this period, the tone decoders are enabled. This allows function tones of various frequencies to be amplified in the guard tone decoder prior to being sent to the respective function tone decoders. The switching of the filter is controlled by circuitry in the TRN4854A Station Control Module.

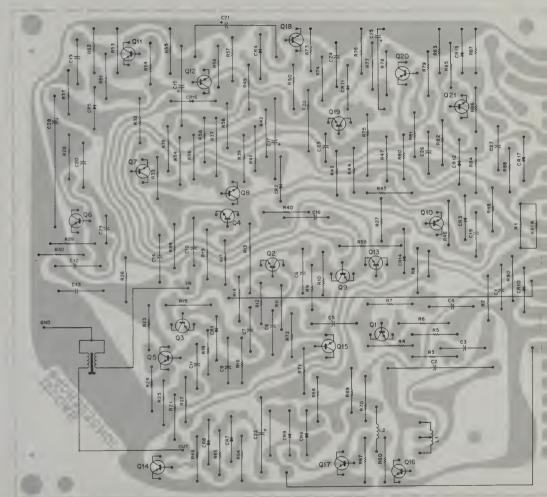
Model Complement

	Model	Module	Reed
			(2175 Hz)
7	ΓLN2376A	TRN4892A	KLN6209A

TRN4892A Guard Tone Decoder Module Circuit Board Detail Schematic Diagram & Parts List Motorola No. PEPS-34635-A (Sheet 2 of 2) 10/5/82 - V & G

ohms; capacitor values are in

Off when guard and function tone as detected to enable gated AGC and functions. Turns on after loss of activity off PTT and disable gated AGC. Turn on is by C25 charge 75 ms to prevent loss of to line interruptions.



TRN4892A Guard Tone Decoder Module Circuit Board Detail Schematic Diagram & Parts List Motorola No. PEPS-34635-A (Sheet I of 2) 10/5/82 - V & G

SHOWN FROM COMPONENT SIDE * R91 LOCATED ON SOLDER SIDE.

80 - DEPS-34432 - O OL - DEPS-34431 - A

parts list

7 LINE DISABLE

9 TONE CONTROL

11 FUNCTION TONE HI

14 GUARD TONE INHIBIT

15 DECODER BIAS SWITCH

16 LINE P T T

17 LINE DRIVER GROUND

18 FUNCTION TONE WINDOW CONTROL

13 DC LINE DISABLE/GUARD TONE DETECT

12 A+

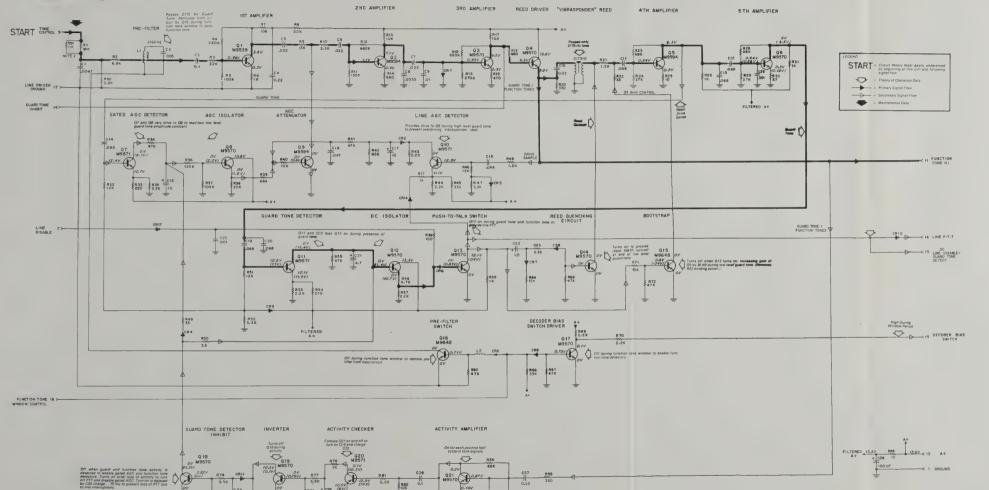
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
STMBUL	PARTINO.	capacitor, fixed: uF ± 10%; 50 V;
		unless otherwise stated
C1	8-82905G26	0047
C2	8-84328429	005 ± 2%
02	8-82905G07	0.1
C2 C3 C4	8-82905G11	0 1 0 22
C5. 6. 7	8-82905G02	022
C8	8-82905G25	0033
C9	8-82905G01	01
C10	8-82905G11	0 22
C11 thru 14	8-82905G04	
C15 C16 C17	23-865136	15 ± 20%; 25 V .047
C16	8-82905G03	.047
C17	23-865136	15 ± 20%, 25 V
C18, 19, 20	8-82905G04	068
C21	23-865137	4.7 ± 20%; 25 V 1.0 ± 20%; 35 V
C22 C23	23-82783B08 21-82187B20	1.0 ± 20%; 35 V .001; 100 V
C24	8-82905G11	0.22
C25	23-82783B12	4.7
C26	8-82905G07	0.1
C27	8-82905G11	0 22
C28	23-82601A25	100 + 150-10%; 20 V
C29	21-82187B20	.001; 100 V
CR1 thru 4	48-83854H01	semiconductor device, diode: (see note) silicon
CR10	48-83654H01	silicon
CR17	48-83654H01	silicon
01117		
		coll, assembly, inductor.
L1	1-80702B11 24-82723H01	1 H; Incl. ground clip choke; 1.2 uH
L2	24-82723H01	choke; 1.2 UH
		transistor: (see note) NPN; type M9539 NPN; type M9594
Q1	48-869539	NPN; type M9539
Q2	48-869594	NPN; type M9594
Q3, 4	48-869570	NPN; type M9570
Q5	48-869594	NPN; type M9594
Q6	48-869570	NPN; type M9570
Q7	48-869571	PNP; type M9571
Q8	48-869570	
Q9	48-869594	NPN, type M9594 NPN; type M9571
Q10, 11 Q12 thru 14	48-869571	NPN; type M9571
Q12 thru 14	48-869570	NPN; type M9570
Q15	48-869648	NPN; type M9648
Q16	48-869642	NPN; type M9642
Q17 thru 19	48-869570	NPN; type M9570
Q20 Q21	48-869571 48-869570	NPN; type M9570 PNP; type M9571 NPN; type M9570
QZI	40-508370	
		resistor, fixed: ±5%; 1/4 W;
	6-11009C96	unless otherwise stated 91k
D4		6 8k
R1	6 11000C60	
R2	6-11009C69	22k
	6-11009C69 6-11009C81 6-11009D06	22k 220k
R2 R3	6-11009C69 6-11009C81 6-11009D06 6-11009C97	22k
R2 R3 R4	6-11009C69 6-11009C81 6-11009D06 6-11009C97 6-11009C49	22k 220k 100k 1k
R2 R3 R4 R5 R6 R7	6-11009C69 6-11009C81 6-11009D06 6-11009C97 6-11009C49 6-11009C73	22k 220k 100k 1k 10k
R2 R3 R4 R5 R6 R7 R8	6-11009C69 6-11009C81 6-11009C06 6-11009C97 6-11009C49 6-11009C73 6-11009C81	22k 220k 100k 1k 10k 22k
R2 R3 R4 R5 R6 R7 R8 R9	6-11009C69 6-11009C81 6-11009C06 6-11009C97 6-11009C49 6-11009C73 6-11009C81 6-11009C77	22k 220k 100k 1k 10k 22k 15k
R2 R3 R4 R5 R6 R7 R8 R9 R10	6-11009C69 6-11009C81 6-11009C97 6-11009C97 6-11009C73 6-11009C73 6-11009C77 6-11009C77	22k 220k 100k 1k 10k 22k 15k 3.3k
R2 R3 R4 R5 R6 R7 R8 R9 R10 R11	6-11009C69 6-11009C81 6-11009C97 6-11009C97 6-11009C97 6-11009C73 6-11009C73 6-11009C77 6-11009C77 6-11009C61 6-11009D02	22k 220k 100k 1k 10k 22k 15k 3.3k
R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R11 R12	6-11009C69 6-11009C81 6-11009D06 6-11009C97 6-11009C49 6-11009C81 6-11009C81 6-11009C61 6-11009D18	22k 220k 100k 1k 10k 22k 15k 3.3k 150k 680k
R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13	6-11009C69 6-11009C81 6-11009C97 6-11009C97 6-11009C49 6-11009C73 6-11009C81 8-11009C77 6-11009C61 6-11009D02 6-11009D18 6-124A73	22k 220k 100k 1k 100k 100k 100k 100k 100
R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13	6-11009C69 6-11009C81 6-11009C96 6-11009C97 6-11009C49 6-11009C73 6-11009C81 6-11009C77 6-11009C61 6-11009D18 6-124A73 6-11009C45	22k 220k 1000k 100k 10k 10k 22k 15k 3.3k 1900k 1
R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15	6-11009C69 6-11009C81 6-11009C06 6-11009C07 6-11009C97 6-11009C73 6-11009C73 6-11009C77 6-11009C61 6-11009D18 6-124A73 6-11009D18	22k 220h 100h 1k 10k 10k 10k 10k 10k 10k 15k 15k 16k 16k 16k 16k 172 W 680
R2 R3 R4 R5 R6 R7 R8 R9 R110 R112 R13 R14 R14 R15	6-11009C69 6-11009C81 6-11009C97 6-11009C97 6-11009C49 6-11009C73 6-11009C81 8-11009C71 6-11009D02 6-11009D02 6-11009D18 6-124A73 6-11009D18 6-11009D18 6-11009D18	22k 100k 110k 110k 115k 10s
R2 R3 R4 R5 R6 R7 R8 R9 R10 R112 R13 R14 R15 R16 R17	6-11099C69 6-11099C81 6-11009C90 6-11009C99 6-11009C49 6-11009C49 6-11009C81 6-11009C61 6-11009C61 6-11009D18 6-124A73 6-11009D18 6-11009D18 6-11009D18 6-11009D18 6-11009D18	22k 100k 100k 100k 100k 22k 150k 150k 150k 680k 10k 172 W 680 680k 670k 10k
R2 R3 R4 R5 R6 R7 R8 R9 R111 R112 R114 R114 R116 R17 R118	6-11099C69 8-11099C81 8-11099C81 8-11099C97 6-11009C49 6-11009C49 6-11009C73 8-11009C61 8-11009C61 8-11009D18 6-11009D18 6-11009D18 6-11009D18 6-11009D18 6-11009D18 6-11009D18 6-11009C73 6-11009C73 6-11009C74	22k 100k 110k 11k 12k 12k 15k 13k 13k 160k 160k 160k 160k 160k 160k 160k 160
R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R14 R15 R16 R17 R16	6-11099C69 6-11099C91 6-11099C97 6-11099C97 6-11099C97 6-11099C49 6-11099C49 6-11099C77 6-11099C77 6-11099C91 6-11099D02 6-11099D02 6-11099D03 6-11099D03 6-11099D03 6-11099D03 6-11099D03 6-11099D03 6-11099C45 6-11099C45 6-11099C45 6-11099C45	22k 100k 100k 110k 115k 22k 15k 3.3k 10pk 10pk 10pk 10pk 10pk 10pk 10pk 10p
R2 R3 R4 R5 R7 R8 R9 R111 R113 R114 R115 R116 R116 R118 R118 R118	6-11099C69 6-11099C97 6-11099C97 6-11099C97 6-11099C97 6-11099C73 6-11099C73 6-11099C73 6-11099C73 6-11099C73 6-11099D02 6-11099D02 6-11099D02 6-11099D03 6-11099C13 6-11099C13 6-11099C13 6-11099C13 6-11099C45 6-11099C45 6-11099C45	22k 12k 12k 17k 18k 18k 19k 19k 19k 19k 19k 19k 19k 19k 19k 19
R2 R3 R4 R6 R7 R8 R9 R9 R11 R13 R13 R15 R16 R17 R18 R18 R17 R18 R19 R20	6-11009C69 6-11009C91 6-11009C97 6-11009C97 6-11009C97 6-11009C97 6-11009C49 6-11009C77 6-11009C77 8-11009C17 6-11009D08 6-11009D08 6-11009D08 6-11009D08 6-11009D08 6-11009C73 6-11009C45 6-11009C45 6-11009C45 6-11009C45	22k 100k 110k 110k 115k 22k 15k 3.3k 150k 680k 270k 10k 480 270k 10k 480 330, 12 W
R2 R3 R4 R5 R6 R7 R8 R8 R101 R112 R113 R114 R115 R116 R117 R118 R119 R119 R119 R119 R119 R119 R119	6-11099C69 6-11099C91 6-11099C97 6-11099C97 6-11099C97 6-11099C73 6-11099C73 6-11099C73 6-11099C73 6-11099C91 6-11099D02 6-11099D02 6-11099D03 6-11099D03 6-11099D03 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C41 6-11099C45 6-11099C43 6-11099C43 6-11099C43 6-11099C43 6-11099C43	22k 100k 100k 100k 100k 22k 350k 350k 680k 10k:12 W 680 680k 330, 12 W 133
R2 R3 R4 R4 R6 R7 R8 R8 R9 R9 R10 R11 R13 R15 R16 R17 R16 R17 R18 R17 R18 R21 R21 R22	6-11009C69 6-11009C91 6-11009C97 6-11009C97 6-11009C97 6-11009C97 6-11009C49 6-11009C73 6-11009C73 6-11009C73 6-11009B18	22h 22h 22h 22h 22h 24h 18h 18h 19h 22h 150h 680h 150h 150h 150h 150h 150h 150h 150h 15
R2 R3 R4 R5 R6 R7 R8 R9 R111 R112 R113 R114 R115 R116 R117 R210 R217 R22 R22 R23	6-11099C69 6-11099C81 6-11099C97 6-11099C97 6-11099C97 6-11099C97 6-11099C49 6-11099C49 6-11099C49 6-11099C49 6-11099C49 6-11099C93 6-11099D9 6-11099D9 6-11099D9 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93 6-11099C93	22k 100k 110k 110k 22k 3.3k 3.3k 660k 10k: 172 W 680k 270k 470 680k 330, 112 W 1.5k 3.3k 3.3k 3.3k 3.3k 3.3k 3.3k 3.3k 3
R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17 R18 R19 R20 R21 R21 R22 R23 R23 R24 R23 R24 R23 R24 R23 R24 R25 R23 R23 R24 R25 R26 R27 R27 R27 R27 R27 R27 R27 R27 R27 R27	6-11099C69 6-11099C69 6-11099C06 6-11099C07 6-11099C97 6-11099C73 6-11099C73 6-11099C73 6-11099C73 6-11099C73 6-11099C73 6-11099C73 6-11099C18 6-11099D18 6-11099D18 6-11099D18 6-11099C18	22k 12b, 12b, 12b, 12b, 12b, 12b, 12b, 12b,
R2 R3 R4 R5 R6 R7 R8 R9 R110 R111 R112 R113 R114 R115 R116 R116 R117 R118 R118 R118 R119 R119 R119 R119 R120 R121 R121 R121 R122 R122 R23 R24 R25 R26 R27	6-11099C69 6-11099C81 6-11099C97 6-11099C97 6-11099C97 6-11099C49 6-11099C49 6-11099C49 6-11099C47 6-11099C47 6-11099C47 6-11099C48 6-11099C18 6-11099C48	22k 100k 110k 110k 22k 22k 3.3k 3.3k 105k 40k 10k 12 W 660 660 670 330,12 W 15,8k 33 88 33 88 33 88 33 88 34 35 35 36 37 38 38 38 38 38 38 38 38 38 38 38 38 38
R2 R3 R4 R4 R5 R6 R6 R6 R7 R8 R9 R6 R6 R6 R7 R8 R9 R11 R12 R14 R14 R15 R16 R15 R16 R15 R16 R17 R18 R17 R18 R19 R22 R24 R24 R24 R25 R26 R27 R26	6-11099C69 6-11009C69 6-11009C09 6-11009C09 6-11009C09 6-11009C49 6-11009C49 6-11009C49 6-11009C49 6-11009C49 6-11009D02 6-11009D02 6-11009D02 6-11009D03 6-11009D03 6-11009D03 6-11009C45 6-11009C49	22k 22b 10c 10c 10c 10c 22k 15c 35c 68c 68c 10c 17c 17c 17c 17c 17c 17c 17c 17c 17c 17
R2 R3 R4 R5 R6 R7 R8 R9	6-11099C69 6-11099C81 6-11099C91 6-11099C97 6-11099C97 6-11099C97 6-11099C97 6-11099C97 6-11099C97 6-11099C97 6-11099C97 6-11099D18 6-11099D18 6-11099D18 6-11099D18 6-11099D18 6-11099C93	22h 12b, 12b, 12b, 12b, 12b, 12b, 12b, 12b,
R2 R3 R4 R8	6-11099C69 6-11099C91 6-11098C96 6-11098C97 6-11098C97 6-11098C97 6-11099C97 6-11099C91	22k 22b 10c 10c 10c 10c 22k 15c 35c 68c 68c 10c 17c 17c 17c 17c 17c 17c 17c 17c 17c 17
R2 R3 R4 R8	6-11099C69 6-11098C69 6-11098C06 6-11098C06 6-11098C77 6-11099C73	22k 12b, 22b 10b, 10b 10b, 10b 10b, 12b 12b, 13b, 13b, 13b, 13b, 13b, 13b, 13b, 13
R2 R3 R4 R5 R6 R7 R6 R7	8-11090CS1 8-11090CS1	22k 100k 100k 100k 22k 100k 25k 105k 35k 45k 10k 10k 10k 112 W 660 660 660 660 660 660 660 660 660 66
R2 R3 R4 R8	8-11090CS1 8-11090CS1	22k 100k 100k 100k 22k 100k 25k 105k 35k 45k 10k 10k 10k 112 W 660 660 660 660 660 660 660 660 660 66
R2 R3 R4	8-11090CGB 6-11090CCB 6-1109	22k 100k 110k 110k 22k 3.3k 3.5k 3.5k 4.7k 4.7k 4.7k 4.7k 4.7k 4.7k 4.7k 4.7
P2 R3 R4	8-11006/216 1-1006/216 1-1006/216 1-1006/216 1-1006/216 1-1006/216 1-1006/217	22k 12k 10k 10k 10k 10k 22k 15k 15k 15k 15k 15k 16k 172 W 680 10k 172 W 680 10k 172 W 170 170 170 170 170 170 170 170 170 170
R2 R3 R4	8-11090508 8-11090508 8-11090508 8-11090508 8-11090504 8-11090504 8-11090504 8-11090504 8-11090504 8-11090504 8-11090504 8-11090504 8-11090504 8-11090504 8-11090504 8-11090504 8-11090508	22h 12b, 12b, 12b, 12b, 12b, 12b, 12b, 12b,
P2 R3 R4	8-11006/CB (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	22k 22b 10c 10c 10c 10c 22k 3556 6806 10c 11c 27b 10c 470 680 335, 112 W 345, 115 W 35, 112 W 35, 112 W 36, 112 W 36, 112 W 37, 112 W 38, 112
R2 R3 R4	8-11090CGB 6-11090CGB 6-110	22k 12k 12k 18k 18k 18k 19k 19k 19k 19k 19k 19k 19k 19k 19k 19
R2 R3 R4	8-110902018 6-110902018	22k 100k 100k 100k 22k 3.5k 3.5k 3.5k 4.7c 680k 680k 10k:12 W 680k 470 680k 470 10k 470 680k 470 10k 470 680k 27k 10k 10k 12 W 12 k 10k 10k 10k 10k 10k 10k 10k 10k 10k 10
R2 R3 R4	8-110906218 6-110906218 6-110906218 6-110906218 6-110906249	22k 12k 10k 10k 10k 10k 22k 15k 15k 15k 15k 15k 16k 17k 17k 17k 17k 17k 17k 17k 17k 17k 17
R2 R3 R4 R4 R5	8-11090503 8-11090503 8-11090503 8-11090503 8-11090504	22h 12b, 12b, 12b, 12b, 12b, 12b, 12b, 12b,
R2 R3 R4	8-11090503 8-11090503 8-11090503 8-11090503 8-11090504	22h 12b, 12b, 12b, 12b, 12b, 12b, 12b, 12b,
R2 R3 R4 R4 R5	8-110906218 6-110906218 6-110906218 6-110906218 6-110906249	22k 12k 17k 17k 17k 17k 18k 18k 19k 18k 19k 19k 19k 19k 19k 19k 19k 19k 19k 19

REFERENCE SYMBOL	PART NO.	DESCRIPTION
R48	6-11009C51	1.2k
R49, 50	6-11009C13	33
R51	6-11009C75	12k
R52	6-11009C61	3.3k
R53	6-11009C57	2.2k
R54	6-11009C35	270
R55	6-11009C89	47k
R56	6-11009C65	4.7k
R57	6-11009C57	2.2k
R58	8-11009C25	100
R59	6-125A49	1k: 1/2 W
R60	6-11009C89	47k
R61	0-11008000	NOTUSED
R62		NOTUSED
R63		NOTUSED
	6-11009C75	12k
R64 R65	6-11009C75 6-11009C61	3.3k
		33k
R66	6-11009C85 6-11009C89	47k
R67, 68		2.2k
R69, 70	6-11009C57	
R71	6-11009C73	10k
R72	6-11009C89	47k
R73	6-11009C49	1k
R74	6-11009C61	3.3k
R75	6-125A49	1k; 1/2 W
R76	6-11009C49	1k
R77	6-11009C63	3.9k
R78	6-11009C49	1k
R79	6-11009C57	2.2k
R80	6-11009C25	100
R81	6-11009C57	2.2k
R82	6-11009C73	10k
R83	6-11009C57	2.2k
R84	6-11009C49	1k
R85	6-11009C09	22
R86	8-11009C93	68k
R87	6-11009C83	27k
R88	6-11009C37	330
R89	6-11009C01	10
R90	6-11009C57	2.2k
R91	6-11009C74	11k
	n	echanical parts
	45-83914G01	GUIDE, card
	9-83697M01	RECEPTACLE, female; 15 used
	5-84220B01	BUSHING, 2 used
	3-84258M01	SCREW, machine: 4-40 x 5/16"; 2 used
	46-84703E01	GUIDE, circuit bd.

librasponder Resonant Reed				PL-7639-O
REFERENCE SYMBOL	MOTOROLA PART NO.		DESCRIPTION	
	KLN6209A	2175 Hz		

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

MODEL TLN2376A



FUNCTION

This module detects 2175 Hz guard tone and converts it into line PTT signal which is required for remote key up of the transmitter. It also amplifies received function tones and distributes them to other function tone decoders in the station (for example the 1950 Hz tone detector in the F1 Control Module).

The automatic gain control circuitry in this module adjusts guard tone and function tone levels for proper operation of tone decoding circuitry independent of input levels to the remote control chassis of the station.

The activity detector stages sense the loss of low level guard tone. The fast turn off circuitry quickly turns off the line PTT signal so the station can rapidly enter the binary mode of operation or un-key the transmitter depending on the commands sent to the station.

This module also has a switchable bandpass filter to allow only the guard tone frequency to enter the module to provide falsing protection. After detection of guard tone, this filter is switched out during the time function commands are sent to the station and during this period, the tone decoders are enabled. This allows function tones of various frequencies to be amplified in the guard tone decoder prior to being sent to the respective function tone decoders. The switching of the filter is controlled by circuitry in the TRN4854A Station Control Module.

Model Complement			
Model	Module	Reed	
		(2175 Hz)	
TLN2376A	TRN4892A	KLN6209A	

TRN4892A Guard Tone Decoder Module Circuit Board Detail Schematic Diagram & Parts List Motorola No. PEPS-34635-A (Sheet 2 of 2) 10/5/82 - V & G

NOTES

- 1. Unless otherwise indicated: resistor values are in ohms, capacitor values are in
- microfarads
 2. R91 located on solder side of circuit board

REFERENCE SYMBOL	PART NO.	DESCRIPTION
		capacitor, fixed: uF
C1	23-865136	15 ± 20%; 20 V
C2	21-82187B20	001 ± 10%; 100 V
C3 C4	23-865136 21-82187B20	15 ± 20%; 20 V .001 ± 10%; 100 V
C5	21-865136	15 ± 20%; 20 V
C6, 7, 8	21-82187B20	.001 ± 10%; 100 V
		41-4-7
CR1 thru 4	48-83654H01	diode: (see note) silicon
CR5	48-82466H13	silicon
CR6 thru 22	48-83654H01	silicon (CR22 optional)
		lamp, incandescent:
DS1	65-83554G01	12 volts; 0.19 amp
		transistor: (see note)
Q1	48-869642	NPN; type M9642
Q2, 3	48-869643	PNP; type M9643
Q4	48-869642	NPN; type M9642
Q5	48-869643	PNP; type M9643
Q6	48-869568	NPN; type M9568
Q7	48-869643	PNP; type M9643
Q8 Q9	48-869642 48-869568	NPN; type M9642 NPN; type M9568
Q10, 11, 12	48-869642	NPN; type M9642
		resistor, fixed: ±5%; 1/4 W;
		unless otherwise stated
R1	6-11009D02	150k
R2	6-11009C87	39k
R3	6-11009C39	390
R4 R5	6-11009C49 6-11009C61	1k 3.3k
R6	6-11009C45	680
R7	6-11009C01	10
R8	6-11009C71	8.2k
R9	6-11009C89	47k
R10	6-11009C71	8.2k
R11	6-11009C45	680
R12 R13	6-11009C61 6-11009C45	3.3k 680
R14	6-11009C01	10
R15	6-11009C89	47k
R16	6-11009C49	1k
R17	6-11009C37	330
R18	6-11009C61	3.3k
R19 R20	6-11009C45 6-11009C01	680 10
R21	6-11009C73	10k
R22, 23	6-11009C59	2.7k
R24, 25	6-11009C73	10k
R26	6-11009C57	2.2k
R27	6-11009C73	10k
R28	6-11009C61	3.3k
R29 R30	6-11009C53 6-11009C69	1.5k
R31	6-11009C69 6-11009C73	6.8k 10k
R32	6-11009C53	1.5k
R33, 34	6-11009C57	2.2k
R35	6-11009C49	1k
R36, 37	6-11009C73	10k
R38, 39	6-11009C97	100k
R40, 41	6-11009C73 6-11009C97	10k
R42 R43	6-11009C97 6-11009C61	100k 3.3k
S1	40-83468E01	switch: slide; spdt
S2, 3	40-83204B01	slide; dpdt
		integrated circuit: (see note)
U1	51-82884L63	Schmitt trigger inverter
U2 ·	51-82884L13	D flip-flop
U3	51-82884L04	quad NOR gate
		echanical parts
	1-80761D38 9-84285C01	PANEL, screened; includes: S1, 2, 3 LAMPHOLDER, single contact
	61-855798	JEWEL, lamp GRN
	46-84603E01	GUIDE, circuit board
	45-83914G01	GUIDE, card; 2 used

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

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ONTROLLER

ONTROL

STATION CONTROL MODULE

MODEL TRN4854B

FUNCTION

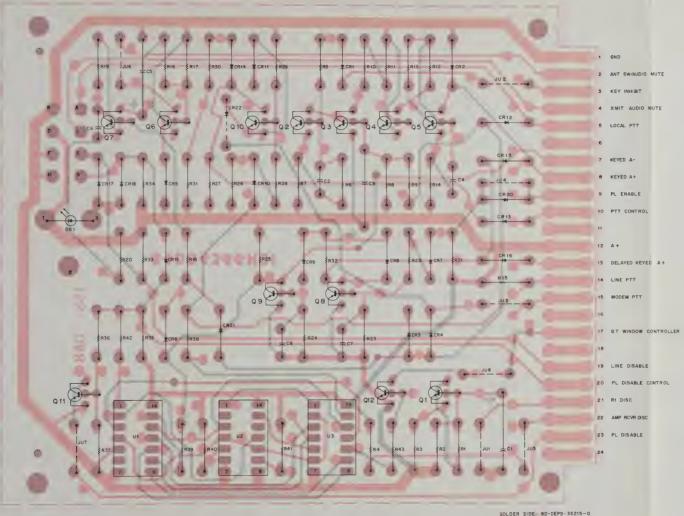
This module integrates control functions from other modules in the station to key the transmitter. Keyed A + and a A - voltages are generated in this module to provide transmitter turn on. Local transmitter keying is accomplished via a panel mounted "XMIT" switch. The LINE DISABLE and PL DISABLE switch also on the front panel, are used to disable remote keying for maintenance purposes, and the PL DISABLE switch is used for local channel monitoring in those cases where a monitor or link receiver is used.

Other circuitry in the model provides for control of the prefilter on the guard tone decoder module. This allows for function tones to pass through the guard tone decoder at the proper time in route to function tone decoder modules such as the F1 control module.

TRN4854B Station Control Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-35213-O (Sheet 2 of 2) 9/24/82 - V&G

STATION CONTROL MODULE

MODEL TRN4854B



SHOWN FROM COMPONENT SIDE

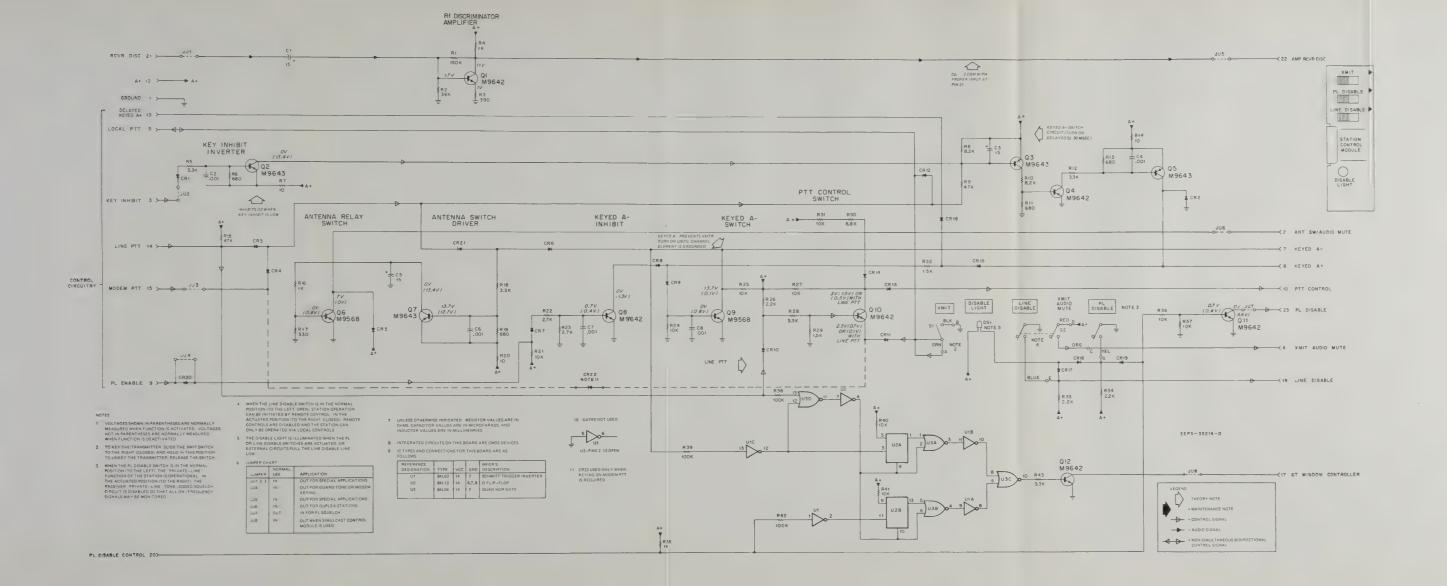
TRN4854B Station Control Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-35213-0 (Sheet I of 2) 9/24/82 - V&G

SOLDER SIDE - 8D-DEPS-35215-0 COMPONENT SIDE 8D-DEPS-35216-0 0L-DEPS-35217-0

parts list

C1 23-865136 capacitor, fixed unit 22-85 capacitor, fixed	
C1 23-865136 capacitor, fised un file 20%; 20 un file 20%; 20%; 20%; 20%; 20%; 20%; 20%; 20%;	CRIPTION
C1 23-865196 15 ±20%;20 V C1 = 10%;10 V C2 = 2421878280 10 = 10%;10 V C3 = 2421878280 10 = 10%;10 V C4 = 2421878280 20 = 10 = 10%;10 V C6, 7.8 = 21.421878280 20 = 10.1218280 20 = 10.1218280 = 10.12182	
C3 23-885136 15 ± 20%; 20 V C4 21-85136 15 ± 20%; 20 V C5 7, 8 = 21-85136 15 ± 20%; 20 V C5 7, 20 V C5	
CS	
CS	
C8.7, 8. 21.82187820 .001 ± 10%; 100V .0	
CF1 thru AB-83554H01 Glode: (see note) AB-83554H01	
CR5 fm 4	
CR5 fm 4	
CR8 thru 22	
DE1	
D51	(a1)
DB1	
01 48-886842 NPR: type M9642 N	
01 48-886842 NPR: type M9642 N	
C2.3 48-865643 PNP: type M9643	,
04 48-868642 NPR: type M6943 OF 48-868643 NPR: type M6943 OF 48-868663 NPR: type M6943 OF 48-868663 NPR: type M6943 NPR: type M6943 OF 48-868664 NPR: type M6943 NPR: type M69	
06 48-895963 PNP. Type M9643 PNP. Type M9642 P	
CB	
O7 48-899843 PIPL Type M9843 CB 48-898642 NPIC Type M9842 CB 48-888686 NPIC Type M9842 CB 48-888686 NPIC Type M9642 R1 68-1009028 resistor, fixed: ±5%; turless otherwise state R2 61-1009029 300 R3 61-1009029 300 R4 61-10090249 11 R6 61-10090249 11 R7 61-10090219 10 R6 61-10090219 10 R7 61-10090219 42.2 R12 61-10090219 42.2 R12 61-10090219 3.30 R12 61-10090219 3.33 R12 61-10090219 3.33 R13 61-10090219 3.33 R14 61-1009029 47k R15 61-1009029 3.33 R16 61-1009029 3.34 R17 61-1009020 3.34 R18 61-1009020 3.34 <	
CB 48-869642 NPN: type M5642 N	
09	
C10, 11, 12 48-868682 NPR: type M6942 R1 6-11009002 R2 6-11009021 30k R2 6-11009021 30k R6 6-11009021 30k R6 6-11009021 31k R6 6-11009021 31k R6 6-11009021 32k R7 R 6-11009021 31k R6 6-11009021 32k R7 R 6-11009021 31k R7 R 6-11009021 31k R8 6-110	
R1 6-11009029 unless otherwise state R2 6-11009029 39 R3 6-11009029 39 R6 6-11009029 39 R6 6-11009029 39 R6 6-11009029 39 R7 6-11009021 10 R8 6-11009021 10 R8 6-11009021 10 R8 6-11009021 62 R8 6-11009021 62 R8 6-11009021 82 R8 6-11009021 83 R8 6-11009021 10 R8 8-11009021 10 R8	
RT 5 - 1050020 unless otherwise state 2	
### 6-11009002 150k ### 6-11009002 150k ### 6-11009003 38k ### 6-1	i; 1/4 W;
R2	3160
Fig. 6 - 11009C49 300 Fig. 6 - 11009C49 31 ki Fig. 6 - 11009C41 33 ki Fig. 6 - 11009C41 10 Fig. 7 - 11009C41 10 Fig. 7 - 11009C41 10 Fig. 6 - 11009C41 63 ki Fig. 6	
PA 6-11009C49 1k BB 6-11009C81 3 3k BB 6-11009C21 680 BB 6-11009C21 680 BB 6-11009C21 8.2k BB 6-11009C24 880 BB 6-11009C28 320 BB 6-11009C29 320 BB 6-11009C29 320 BB 6-11009C29 320 BB 6-11009C29 327 BB 6-11009C29 328 BB 6-11009C29 10k <t< td=""><td></td></t<>	
R5 6-11009C61 3 3 N R R6 6-11009C61 640 R7 R R6 6-11009C61 840 R7 R R6 8-11009C61 840 R7 R R6 8-11009C61 840 R7 R R6 8-11009C61 840 R R6 8-11009C61 840 R R7 R R R6 8-11009C61 840 R R R R R R R R R R R R R R R R R R R	
R6 6-11009C45 680 R7 6-11009C17 8-2, R8 6-11009C17 8-2, R11 6-11009C17 8-2, R11 6-11009C17 8-2, R11 6-11009C18 680 R12 8-11009C18 680 R13 8-11009C18 680 R14 8-11009C18 680 R15 8-11009C18 680 R16 6-11009C18 680 R17 8-1009C18 680 R17 8-1009C18 680 R18 6-11009C18 680 R19 8-11009C18 680 R19 8-1109C18 680 R19 8-11009C18	
RF	
R8 6-11009C71 6-2x R9 6-11009C71 6-2x R9 6-11009C71 6-3x R1 6-11009C71 6-3x R1 6-11009C71 6-3x R1 6-11009C71 6-3x R1 6-11009C74 6-3x R1 6-11009C74 6-3x R1 6-11009C74 6-3x R1 6-11009C74 7-3x R1 6-11009C74 7-3x R1 6-11009C74 7-3x R1 6-11009C73 10x R2 6-11009C73 10x R3 6-11009C73 10x	
Fig. 6	
## 100000000000000000000000000000000000	
R11 6-11009C45 680 R12 6-11009C45 680 R13 6-11009C45 680 R14 6-11009C45 680 R15 6-11009C49 11 R17 6-11009C49 11 R17 6-11009C49 12 R20 6-11009C45 280 R20 6-11009C73 10 R21 6-11009C73 10 R22 6-11009C73 10 R22 8-11009C73 10 R23 6-11009C73 10 R24 10 R25 6-11009C73 10 R26 6-11009C73 10 R27 6-11009C73 10 R28 6-11009C73 10 R28 6-11009C73 10 R29 6-11009C73 10 R29 6-11009C73 10 R29 6-1109C73 10 R29 6-11009C73 10 R	
R12 6-11009C61 3.3k R13 6-11009C61 680 R14 6-11009C01 10 R14 6-11009C01 10 R15 6-11009C01 10 R16 6-11009C01 10 R17 6-11009C01 10 R18 6-11009C01 10 R22 23 6-11009C01 10 R22 24 6-11009C01 10 R22 25 6-11009C01 10 R24 25 6-11009C01 10 R25 6-11009C01 10 R26 6-11009C01 10 R27 6-11009C01 10 R27 6-11009C01 10 R27 6-11009C01 10 R28 6-11009C01 10 R29 6-11009C01 10 R30 8-11009C01 10 R30 6-11009C01	
613 6-1009C45 680 F14 6-1009C45 10-10-10-10-10-10-10-10-10-10-10-10-10-1	
R14	
R15	
R16 6-11009C49 1k R17 6-11009C49 330 R18 6-11009C41 330 R18 6-11009C41 330 R18 6-11009C41 10 R21 6-11009C73 10k R22 23 6-11009C73 10k R22 23 6-11009C73 10k R22 23 6-11009C73 10k R23 25 6-11009C73 10k R24 25 6-11009C73 10k R25 6-11009C73 10k R26 6-11009C61 3.3k R27 6-11009C61 3.3k R28 6-11009C61 1.5k R29 6-11009C73 10k R29 6-11009C73 10k R20 6-11009C73 10k R21 10k R22 6-11009C73 10k R22 6-11009C73 10k R23 37 6-11009C73 10k R24 6-11009C73 10k R25 37 6-11009C73 10k R26 6-11009C73 10k R27 10k R27 10k R28 10k	
R17	
R18 6-11009C61 3.3k R19 6-11009C61 620 R29 6-11009C62 100 R29 6-11009C62 100 R29 6-11009C62 100 R22 23 6-11009C62 100 R28 6-11009C62 100 R28 6-11009C61 3.3k R28 6-11009C61 3.3k R29 6-11009C61 3.3k R29 6-11009C61 100 R29 6-11009C61 100 R29 6-11009C61 100 R29 6-11009C62 100 R29	
R19 6-11009C45 880 R20 6-11009C01 10 R21 6-11009C07 10 R21 6-11009C73 10 R22 6-11009C73 10 R23 6-11009C73 10 R26 6-11009C73 10 R27 6-11009C73 10 R28 6-11009C73 10 R29 6-11009C73 10 R30 6-11009	
R20	
R21 6-11006C73 10k R22.23 6-11006C93 10k R24.25 6-11006C93 10k R27 6-11006C73 10k R28 6-11006C73 10k R29 6-11006C73 10k R20 6-11006C73 10k R21 106C73 10k R22 6-11006C73 10k R23.34 6-11006C73 10k R24 6-11006C73 10k R25.37 10k R25.37 10k R26 6-11006C73 10k R27 10k R27 10k R28 10k	
R24_25	
R24_25	
R26 6-11009C73 2.2k R27 6-11009C73 3.1k R28 6-11009C73 3.1k R30 6-11009C83 3.8k R31 6-11009C83 1.5k R31 6-11009C83 1.5k R32 8-11009C83 1.5k R32 8-11009C73 10k R32 8-11009C73 10k R32 8-11009C73 10k R33 9-11009C73 10k R38 9-11009C73 10k R38 9-11009C97 10k R38 9-11009C97 10k R42 6-11009C97 10k R42 6-11009C97 10k R42 6-11009C97 10k R43 8-11009C97 10k R44 6-11009C97 10k R45 8-11009C97 10k R46 109C97 10k R47 8-11009C97 10k R48 8-11009C97 10k R48 8-11009C97 10k R49 8-1100	
R27 6-11009C73 10k R28 6-11009C81 3.3% R29 6-11009C83 1.5% R30, 34 6-11009C83 1.5% R30, 39 6-11009C87 10k R30	
R28 6 11009C61 3.3k R29 6 11009C53 1.5k R30 6 11009C53 1.5k R30 6 11009C59 6.8k R32 6 11009C59 1.5k R33 34 6 11009C67 2.2k R33 37 6 11009C67 10k R35 37 6	
R29 6-11009C59 1.5k R30 6-11009C59 6.8k R31 6-11009C79 10k R31,34 6-11009C79 2.2k R35,34 6-11009C79 10k R38,37 6-11009C79 10k R38,37 6-11009C79 10k R38,37 6-11009C79 10k R38,37 6-11009C79 10k R38,37 6-11009C79 10k R38,37 6-11009C81 3.3k R38,37 6-11009C81 3.3k R43 6-11009C81 3.3k R43 6-11009C81 3.3k R43 6-11009C81 3.3k R43 6-11009C81 3.3k R43 6-11009C81 10k R44 6-11009C81 3.3k R45 6-11009C81 10k R45 8-11009C81	
R30	
R31 6-11009C73 10k R32,34 6-11009C53 1.55 R33,34 6-11009C53 1.55 R33,37 6-11009C73 10k R38,39 6-11009C73 10k R38,39 6-11009C73 10k R42 6-11009C97 100k R42 6-11009C97 100k R43 6-11009C97 100k R44 6-11009C97 100k Switch S1 40-83468E01 slide, spot s	
R32 6 11009C57 2 22k R33, 34 6 11009C57 2 22k R35 6 11009C49 1k R36, 37 6 11009C77 10k R36, 38 6 11009C77 10k R36, 39 6 11009C77 10k R36, 30 6 11009C97 10k R42 6 11009C97 10k R43 6 11009C91 3,3k St 40-83468E01 stide, spdt stide, spdt stide, spdt ut 51 82884L83 Schmitt fragger inverte U1 51-82884L83 Schmitt fragger inverte U2 51-82884L3 U1 51-82884L83 Schmitt fragger inverte U2 51-82884L3 Schmitt fragger inverte U3 51-82884L83 U1 51-82884L83 Schmitt fragger inverte U2 51-82884L3 Schmitt fragger inverte U2 51-82884L3 Schmitt fragger inverte U2 51-82884L3 Schmitt fragger inverte U3 51-82884L83 Schmitt fragger inverte	
F33, 34 6-11009C47 2.2x F38, 37 6-11009C49 10.10 F38, 37 6-11009C72 10.0 F38, 37 6-11009C72 10.0 F38, 37 6-11009C73 10.0 F38, 40, 41 6-11009C97 10.0 F38, 40-83468E01 slide, 5pd1 sl	
R35 6-11009C49 1k R36,37 6-11009C73 10k R36,38 6-11009C73 10k R36,39 6-11009C97 100k R42 6-11009C97 100k R43 6-11009C91 3.3k S1 40-83468E01 slide, spdt slide, spd	
R36, 37 6-11009C97 10k R38, 39 6-11009C97 10ck R40, 41 6-11009C97 10ck R42 6-11009C97 10ck R43 6-11009C97 10ck R43 6-11009C91 3.3k Sti 40-83488E01 slide, dpd1 slide, spd1 slide, dpd1 slide, dpd1 slide, dpd1 10ck U1 51-82884L53 Schmitt Ingger inverte U2 51-82884L53 U2 51-82884L54 up quad NOR gate mechanical parts	
R38,39 611009C97 100k R40,41 611009C97 100k R42 611009C97 100k R43 611009C97 100k Switch S1 40-83488E01 slide, spot slide, spo	
R40, 41 6 11009C97 10k R42 6 11009C97 10k R43 6 11009C91 3.3k Still 8 11009C91 3.3k Still 8 11009C91 3.3k Still 8 11009C91 3.3k Still 8 11009C91 3.3k	
R42 6-11090907 100k R43 6-11090907 100k S1 40-83468E01 slide, spot S2, 3 40-832468101 slide, spot slid	
R43 6-1009C61 3.3k S1 40-83468E01 switch stide, sport sti	
\$\text{S1} 40.83468E01 \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \text{slide, spdt} \qua	
\$1 40-83-486E01 stilde, spot stilde, spot stilde, spot stilde, dpd1 U1 51-8284L63 Schmitt trigger reverte U2 51-8284L64 Submitted U2 51-8284L04 quad NOR gate mechanical parts	
\$2,3 40-83204801 slide; dpdt U1 51-82884L83 Schmitt trigger inverte U2 51-82884L13 D ftp-flop U3 51-82884L04 quad MOR gate mechanical parts	
U1 51-82884L63 Integrated circuit: (see U2 51-82884L13 Schmitt trigger inverte U3 51-82884L04 Ditip-flop U3 51-82884L04 quad NOR gate mechanical parts	
U1 5182884L63 Schmitt trigger inverte U2 5182884L13 D ftip-flop U3 5182884L04 quad NOR gate mechanical parts	
U1 51-82884L63 Schmitt trigger inverte U2 51-82884L13 Dftip-flop U3 51-82884L04 quad NOR gate mechanical parts	(aton sea
U2 51-82884L13 D flip-flop U3 51-82884L04 quad NOR gate mechanical parts	rter
mechanical parts	
1 00704D00 DANIEL	antividen Co. O
1-80761D38 PANEL, screened, incl 9-84285C01 LAMPHOLDER, single	nerudes 51, 2,
9-84285C01 EAMPHOLDER, Single 61-855798 JEWEL, lamp GRN	ne contact
45-83914G01 GUIDE, card; 2 used 3-125790 SCREW, machine, 4-40	40 × 505" 0

note: For optimum performance, diodes, transistors, and integrated circuits mube ordered by Motorola part numbers



STATION CONTROL MODULE MODEL TRN4854B

FUNCTION

This module integrates control functions from other modules in the station to key the transmitter. Keyed A + and a A - voltages are generated in this module to provide transmitter turn on. Local transmitter keying is accomplished via a panel mounted "XMIT" switch. The LINE DISABLE and PL DISABLE switch also on the front panel, are used to disable remote keying for maintenance purposes, and the PL DISABLE switch is used for local channel monitoring in those cases where a monitor or link receiver is used.

Other circuitry in the model provides for control of the prefilter on the guard tone decoder module. This allows for function tones to pass through the guard tone decoder at the proper time in route to function tone decoder modules such as the F1 control module.

> TRN4854B Station Control Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-35213-O (Sheet 2 of 2) 912482 - V4cc



STATION CONTROL MODULE

MODEL TRN4854A



MUTE

NUTE

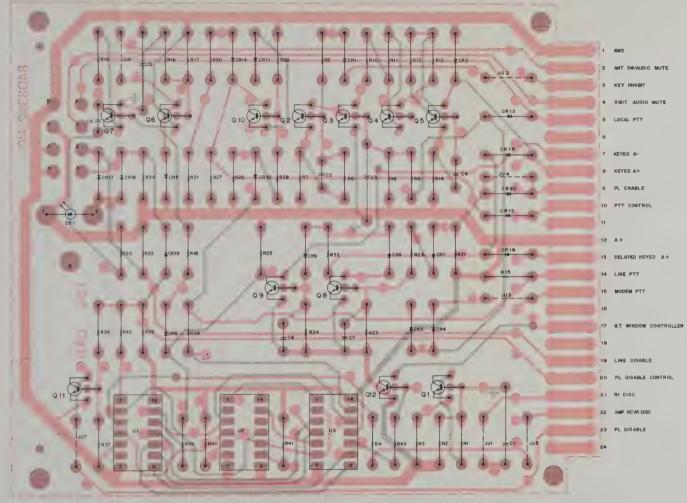
NTROLLER

FUNCTION

This module integrates control functions from other modules in the station to key the transmitter. Keyed A + and A- voltages are generated in this module to provide transmitter turn on. Local transmitter keying is accomplished via a panel mounted "XMIT" switch. The LINE DISABLE and PL DISABLE switches also on the front panel, are used to disable remote keying for maintenance purposes, and the PL DISABLE switch is used for local channel monitoring in thoses cases where a monitor or link receiver is used.

Other circuitry in the module provides for control of the prefilter on the guard tone decoder module. This allows for function tones to pass through the guard tone decoder at the proper time in route to function tone decoder modules such as the F1 control module

TRN4854A Station Control Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34636-O (Sheet 2 of 2) 5/12/82 - V & G



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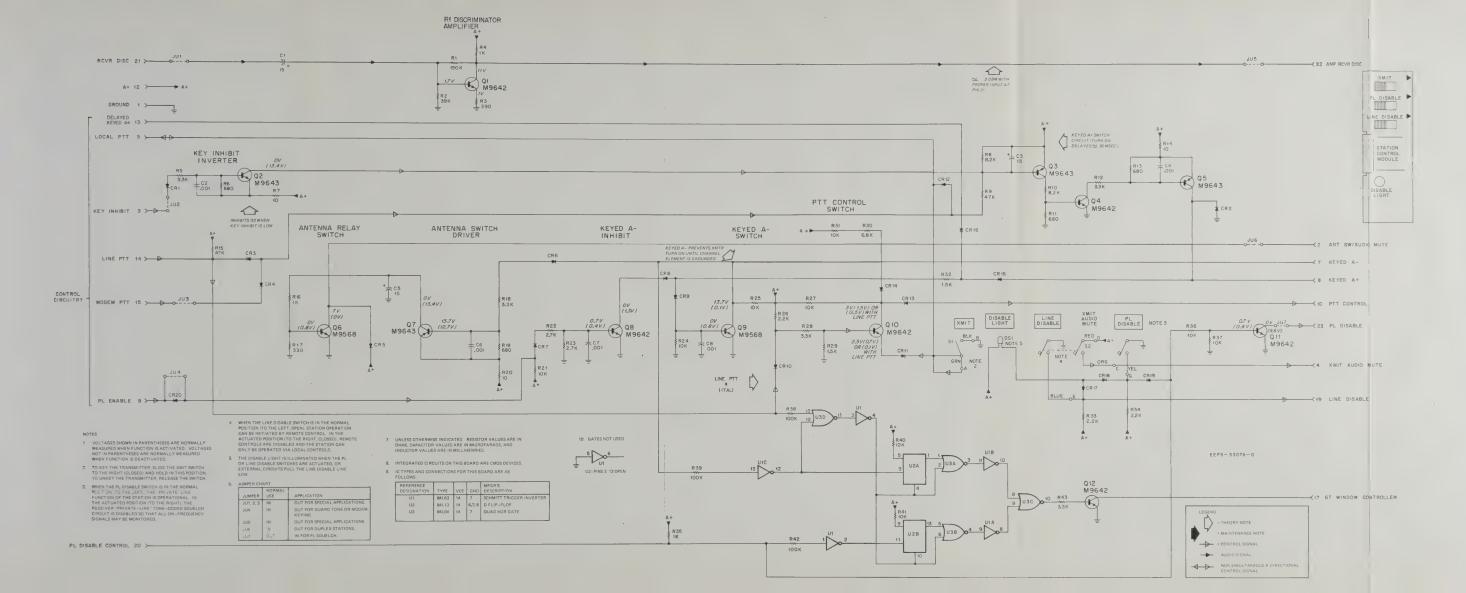
TRN4854A Station Control Module Circuii Board Detail, Schematic Diagram & Paus Las Motorola No. PEPS-34636-O (Sheet 1 of 2) 5/12/82 - V & G

SOLDER SIDE + BD-DEPS-34436-0 COMPONENT SIDE + BD-DEPS-34435-0 OL-DEPS-34434-0

parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed uF
C1	23-865136	15 + 20%, 20 V 001 ± 10%, 100 V
C2	21-82187B20	001 ± 10%, 100 V
C3	23-865136	15 ± 20%, 20 V-
C4	21-82187820	.001 ± 10%, 100 V 15 ± 20%; 20 V
C5	21-865136	15 ± 20%; 20 V
C6, 7, 8	21-82187820	001 ± 10%, 100 V
		diode: (see note)
CR1 lhru 4	48-83654H01	silicon
CR5 CR6 thru 20	48-82466H13 48-83654H01	Silicon Silicon
		lamp, incandescent
DS1	65-83554G01	12 votts; 0 19 amp
		Iransistor (see note)
Q1	48-869642	NPN, lype M9642
Q2, 3	48-869643	PNP, type M9643
Q4	48-869642	NPN, type M9642 PNP; type M9643
Q5	48-869643	PNP: type M9643
Q6	48-869568	NPN: type M9568
Q7	48-869643	PNP; type M9643
Q8	48-869642	NPN, type M9642
Q9	48-869568	NPN, type M9568
Q10, 11, 12	48-869642	NPN, type M9642
		resistor, fixed: ±5%; 1/4 W; unless otherwise stated
R1	6.11000D02	unless otherwise stated 150k
	6-11009D02 6-11009C87	39k
R2 R3	6-11009C87	39k 390
	6-11009C39	
R4	6-11009C49	1k
R5 R6	6-11009C61	3.3k 680
	6-11009C45	10
R7 R8	6-11009C01 6-11009C71	10 8 2k
R9	6-11009C89	47k
910 811	6 11009C71 6-11009C45	8.2k 680
R12	6-11009C61	3.3k
R13	6-11009C45	680
R14	6-11009C01	10
R15	6-11009C89	47k
R16	6-11009C49	1k
R17	6-11009C37	330
R18	6-11009C61	3.3k
R19	6-11009C45	680
R20	6-11009C01	10
R21	6-11009C73	10k
R22, 23	6-11009C59	2.7k
R24, 25	6-11009C73	10k
R26	6-11009C57	2.2k
R27	6-11009C73	10k
R28	6-11009C61	3.3k
R29	6-11009C53	1.5k
R30	6-11009C69	6.8k
R31	6-11009C73	10k
R32	6-11009C53	1.5k
R33, 34	6-11009C57	2.2k
R35	6-11009C49	1k
R36, 37	6-11009C73	10k
R38, 39	6-11009C97	100k
R40, 41	6-11009C73	10k
R42 R43	6-11009C97 6-11009C61	100k 3.3k
		switch:
S1	40-83468E01	slide, spd1
S2, 3	40-83204B01	slide, dpdl
114	54 000044.63	integrated circuit: (see note)
U1	51-82884L63	Schmitt trigger inverter
U2 U3	51-82884L13 51-82884L04	D flip-flop quad NOR gate
-		echanical parts
	1-80761D38	PANEL, screened, includes \$1, 2, 3
	9-84285C01	LAMPHOLDER, single contact
	61-855798	JEWEL, lamp GRN
	46-84603E01	GUIDE, circuit board
	45-83914G01	GUIDE, card, 2 used
		SCREW, machine, 4-40 x 5/16", 2 used

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers



STATION CONTROL MODULE

MODEL TRN4854A

FUNCTION

This module integrates control functions from other modules in the station to key the transmitter. Keyed A + and A - voltages are generated in this module to provide transmitter turn on. Local transmitter keying is accomplished via a panel mounted "XMIT" switch. The LINE DISABLE and PL DISABLE switches also on the front panel, are used to disable remote keying for maintenance purposes, and the PL DISABLE switch is used for local channel monitoring in thoses cases where a monitor or link receiver is used

Other circuitry in the module provides for control of the prefilter on the guard tone decoder module. This allows for function tones to pass through the guard tone decoder at the proper time in route to function tone decoder modules such as the F1 control module

> TRN4854A Station Control Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34636-O (Sheet 2 of 2)



MOTOROLA INC.

Communications Sector

ALARM LOGIC MODULE

MODEL TRN4857A

1. GENERAL

The alarm logic module is used in a Motorola radio paging station. It provides an alarm output for any of three alarm conditions: audio alarm, rf alarm, or system alarm. The alarm output is provided by the contacts of relay K1, located on the circuit board. The relay contacts are rated at 500 mA maximum, 100 V dc maximum, and 15 watts maximum.

2. INSTALLATION

- The alarm logic module is supplied with two card guides that allow the module to be installed in either a unified or non-unified remote control chassis in the station.
- 2.2 On stations using a unified remote control chassis, the alarm logic module is installed in position 7. The relay contact output is available at TB3-2 and TB3-3 on the interconnect board. On stations using a non-unified remote control chassis, the alarm logic module is installed in position 6. The relay contact output is available at TB2-3 and TB2-5 on the interconnect board.

3. POWER THRESHOLD ADJUSTMENTS

- Step 1. Remove module from remote control chassis and place on extender card.
- Step 2. Preset the following controls as viewed from the module front panel. (Refer to circuit board detail for location of controls.)
- RF Forward (R18) fully counterclockwise
- Audio (R9) fully counterclockwise
- RF Reverse (R23) fully clockwise
- Disable System Timer by setting switch S4 to "ON"

- Step 3. Install module and card extender into remote control chassis.
- Step 4. Connect a jumper from J100-13 on the remote control interconnect board to the forward power terminal (white) on the wattmeter. Make sure the red (reverse power) wire is not connected to J100-13.
- Step 5. Set wattmeter to Fwd High. Keying into a 50 ohm load, set output power to 18% of rated output power of the station.
- Step 6. Rotate the RF Reverse control (R23) on the alarm logic module, until the alarm LED just lights.
- Step 7. Disconnect the jumper stated in Step 4, and connect the red (reverse power) wire from the wattmeter to J100-13.
- Step 8. Tune transmitter to 50% of rated output power.
- Step 9. Rotate the RF Forward control (R18) on the alarm logic module, until the alarm LED just lights.
- Step 10. Tune the station to rated power output.

4. AUDIO LEVEL ADJUSTMENT

- 4.1 The alarm logic module modulation check requires that the initial burst of high level guard tone be used to verify proper audio level. Any control configuration which does not begin the keying sequence with high level guard tone, requires the modulation check to be disabled on the alarm logic module. To disable the modulation check, turn R9 on the alarm logic module fully counterclockwise.
- 4.2 If the modulation check is to be used to verify proper audio level, the audio trip point must be set

by R9, to a point 6 dB below the normal level of high level guard tone. Follow the procedure outlined in Steps 1 and 2.

NOTE

The station must be in normal operating condition before the audio trip point on the alarm logic module is set (phone line and exciter level adjustments must be set at normal levels). Any change in exciter level adjustment requires readjustment of the audio trip point on the alarm logic module.

Step 1. Apply a 2175 Hz sine wave at a level 6 dB below normal high level guard tone to the phone line.

Step 2. Monitor the voltage at pin 7 of U1 on the alarm logic module and adjust audio control R9 until this voltage just drops to near ground.

5. SYSTEM TIMER PROGRAMMING

5.1 Dip Switch S1 (actually S1-S8) is used to program the system timer. Positions 1, 2 and 3 are not used (always in "ON" position). Position 4 is used to disable the timer. If S4 is "on" the timer is disabled. If S4 is "off" the timer causes a system alarm at a programmable time after loss of push-to-talk. Positions 5, 6, 7 and 8 are used to program the timer. The following table gives approximate times for each combination of switch positions.

Table 1. System Timer Programmable Times

S8	S7 ·	. S6	S5	Time
0	0	0	0.	10 seconds
0.	0	. 0	1	21 seconds
0	0	1	0	42 seconds
0	. 0	1	1	1.5 min.
0	1	0	10	2.8 min.
0	1	0	1	5.7 min.
0 .	1	- 1	0	11.3 min.
0	1	1	1	23 min.
1	0 .	0	0	45 min.
1	0	0	. 1	1.5 hr.
1	0	1	0	3 hr.
1	0	1	1	6 hr.
1	1	0	0	12 hr.
1 .	1 .	0	1	1 day
1	1	1	0	2 days
1	1	1	1	4 days

0 = ON

1 = OFF

5.2 An example is shown in Figure 1, on how dip switch S1 is set to program the system timer to produce an alarm 45 minutes after loss of push-to-talk. Refer to Figure 1.

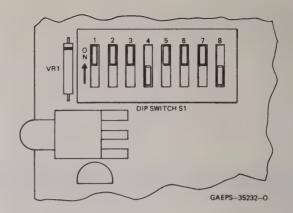


Figure 1. Timer Set to Alarm 45 Minutes After Loss of Push-To-Talk

6. ALARM LOGIC MODULE JUMPERING INFORMATION

The relay contacts may be jumpered to either open or close on an alarm or on verification. The alarm logic module is shipped with jumpers set to close the contacts on an alarm. See jumper table on the schematic diagram for other possible jumper configurations.

7. THEORY OF OPERATION

7.1 AUDIO ALARM

Integrated circuit U1C amplifies the unnotched microphone audio and applies it to level detector CR1 and C5. It is then applied to U1B-5, which compares the audio level with a reference level set by R9 at U1B-6. The reference level is set for an audio level of 6 dB below normal high level guard tone. During high level guard tone, delayed keyed A+ is inverted by U2A-2, and applied to latch U3B and U3C. If high level guard tone is of sufficient level, a logic low ("0") is latched at U3C-10. This indicates there is no audio alarm. If high level guard tone is degraded by more than 6 dB, a logic high "1" appears at U3C-10, indicating an audio alarm at pin 17.

7.2 RFALARM

7.2.1 Operational amplifier U1D samples the forward power (pin 22) as detected by the wattmeter, the forward power is compared to a reference level set by R18. The reference level is set to one-half of the rated power, a logic high ("1") appears at U3A-3, indicating

an rf failure. In a similar manner U1A samples the reflected power (pin 8) and compares it to a reference level set by R23 (18% of station power). If the reflected power exceeds the pre-set limit, a logic high ("1") appears at U3A-3, indicating an rf alarm.

7.2.2 Transistor Q9 is a constant current source for Zener diode VR1. VR1 is a precision temperature compensated voltage reference, that is used by the audio and rf comparators.

7.3 SYSTEM ALARM

Integrated circuit U6 is a programmable timer. C10 and R35 form an RC time constant for an oscillator that is divided by 24 flip-flop stages; the last 16 stages are selectable by a four-bit binary code programmed by switches S5, 6, 7, and 8. Switch S4 can be closed to disable the timer completely. The timer is reset by Q7 via CR2, CR3, or CR4, whenever there is a push-to-talk function. C13 causes the timer to reset on initial power up. If a push-to-talk function does not occur within a predetermined time limit, a system alarm occurs via Q3.

7.4 VERIFICATION LOGIC CIRCUITRY

The verification logic circuit consists of U4 and U2B, C, and F. When a channel element ground appears at pin 3 and an audio signal appears at pin 11 with

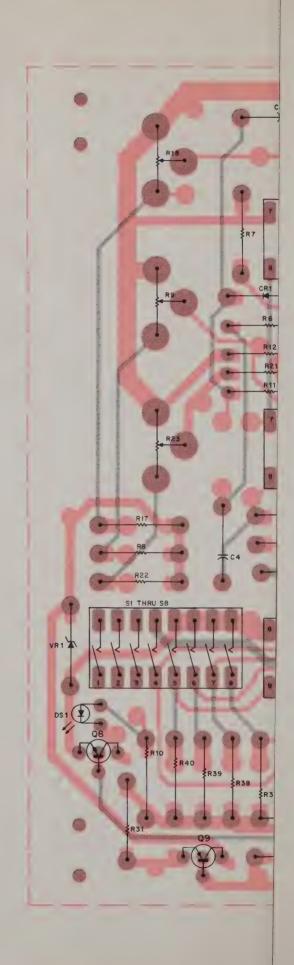
rated rf power at pin 22, a logic high appears at the output of U4B-4. If JU2 is in, relay K1 is activated to provide verification. Transistors Q4 and Q5 supply open collector outputs to indicate the station is keyed up in the binary mode (Q4) or the tone mode (Q5).

7.5 ALARM LOGIC CIRCUITRY

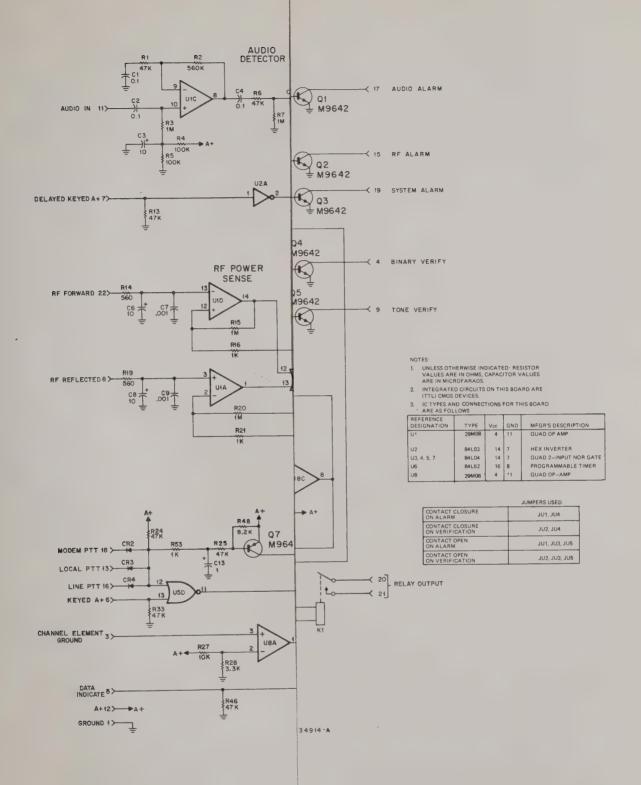
The alarm logic circuitry consists of U5, U2D, E, and U8C. U5 detects any of the alarm conditions (audio, rf, or system). Upon detection of an alarm, U5A-3 goes low, causing U2D-8 to go high. The output of U2D is applied to R41, C12, and U8C, to form a time delay that blocks transient alarm conditions that occur during the key-up sequence. The output of U8C is at a logic high ("1") when an alarm condition exists. The output of U8C-8 is routed to JU1, which can be connected to operate K1 relay. The alarm signal also lights the front panel alarm LED (DS1) via Q8. During an alarm condition U7 decodes the type of alarm. Transistors Q1, Q2, and Q3 provide open collector outputs to indicate an audio alarm (Q1), and rf alarm (Q2), or a system alarm (Q3).



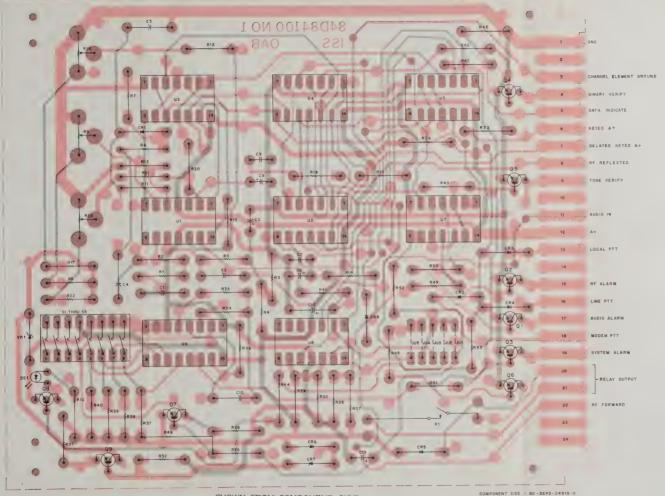




TRN4857A Alarm Logic Module Schematic Diagram, Circuit Board Detail & Parts List Motorola No. PEPS-34991-O (Sheet 1 of 2) 8/31/82 - V&G



TRN4857A Alarm Logic Module Schematic Diagram, Circuit Board Detail, & Parts List Motorola No. PEPS-34991-O (Sheet 2 of 2) 8/31/82 - V&G



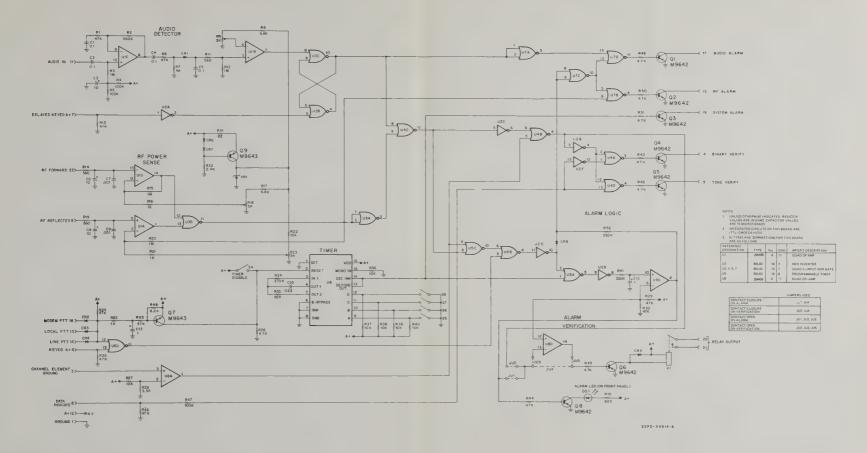
TRN4857A Alarm Logic Module Schematic Diagram, Circuit Board Detail & Parts List Motorola No. PEPS-34991-O (Sheet I of 2) 8/31/82 - V&G

SHOWN FROM COMPONENT SIDE

COMPONENT SIDE * BD - DEPS-34915-0 SOLDER SIDE * BD - DEPS-34916-0 OL - DEPS-34917-A

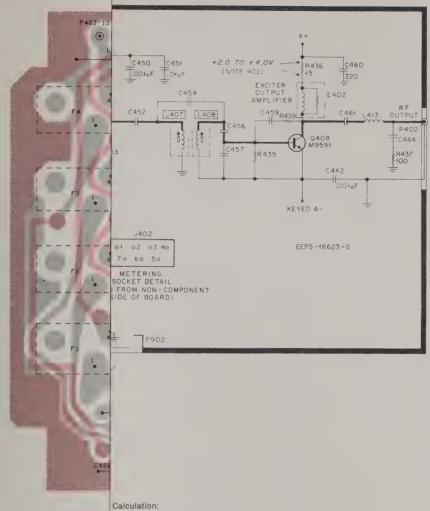
parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed: ± 10%, 100 V, unless otherwise stated
C1.2	8-84637L14	0.1 uF
C3	23-11013C54	10 uF ± 20%; 15 V
C4.5	B-84637L14	0.1 uF
C6	23-11013C54	10 uF ± 20%, 15 V
C6 C7	21-11015B13	.001 uF
C8	23-11013C54	10 uF + 20%: 15 V
C9	21-11015B13	10 uF ± 20%; 15 V .001 uF
C10	8-846371.44	
C10 C11	0.04021 544	NOTUSED
C12	23-84538G14	1 uF 35 V
C13	23-11013D01	NOT USED 1 uF. 35 V 1 uF. 20 V
00000	40.000541404	diode: (see note)
CR1, 2, 3, 4 CR5	48-83654H01 48-82466H13	silicon
CR6. 7. 8	48-82466H13 48-83654H01	
CR0, 7, 0	40-030347101	silicon
		light emitting diode:
DS1	48-88245C28	red
601	80-82617M01	relay 1 form A; coil res 820
PL 1	00-02017MI01	110111 A, COI 163 G20
		transistor: (see note)
Q1 thru 6	48-869642	NPN type M9642
Q7	48-869643	NPN type M9642 PNP, type M9643 NPN, type M9642
Q8	48-869642	NPN, type M9642
Q9	48-869643	PNP; type M9643
		resistor fixed ±5% 14W
		unless otherwise stated
R1	6-11009C89	47k
R2	6-11009D16	560k
A 3	6 11009D22	1 meq
R4 5	6-11109C97	100h
R6	6-11009C89	47k
R7	6-11009D22	1 meg
R8	6 11 194 69	6.84
A9	16-83083G07	variat e 5k
R10	6-11009C47	820
R11	6-11009C43	560
R12	6-11009D22	1 meg
R13	6-11009CB9	47k
R14	6-11009C43	560
R15	6-11009D22	1 meg
R16	6-11009C49	1k
R17	6-11009C69	6.8k
R18	18-83083G07	variable, 5k
R19	6-11009C43	560
R20	6-11009D22	1 meg
R21	6-11009C49	1k
R22	6-11009C77	15k
R23	18-83083G07	variable, 5k
R24, 25	6-11009C89	47k
R26	6-11009C65	4.7k
R27	6-11009C73	10k
R28	6-11009C61	3.3k
R29, 30	6-11009C81	3.3K 47k
R31	6.11000C23	82
R32	6-11009C23 6-11009C58	2.4k
R32 R33	6-11009C58 6-11009C89	2.4k 47k
R33 R34	6-11009C89 6-11009D08	47k 270k
R34 R35	6-11009D08 6-11009C95	270k 82k
	6-11009C95 6-11009C75	10k
R36 thru 40	6-11009D10	220:
	6-11009D10	330) 4.7k
R42 thru 45 R46	0-11009000	4.7k
R46 R47	6-11009C89	47k 100k
	6-11009C97 6-11009C71	
R48	6-11009C/1	8.2k 4.7k
R49, 50, 51	6-11009C65	4.7K
R52 R53	6-11009D10 6-11009C49	330k 1k
nuo	U-1009C48	16
S1	40-83022M03	switch:
01	-0-03022MU3	8-position: (spst)
		Integrated circuit: (see note)
U1	51-83629M08	quad op-amplifier hex inverter
U2	51-82884L03	hex inverter
U3, 4, 5	51-82884L04	quad 2-input NOR gate
U6	51-82884L62	programmable timer
U7	51-82884L04	quad 2-input NOR gate
U8	51-83629M08	quad op-amplifier
VR1	48-82372L04	voltage regulator
YEST.		Zener type; 6.25 V echanical parts
	3-125790	SCREW, machine: 4-40 x 5/16"; 2 used
	45-83914G01	GUIDE, card: 2 used
	46-84703E01	GUIDE, circuit board
	64-831631 19	PANEL screened
	9-83697M01	RECEPTACLE, board mounting, 24 uses
		GUIDE, circuit board PANEL, screened RECEPTACLE, board mounting, 24 use BUSHING



TRN4857A Alarm Logic Module Schematic Diagram, Circuit Board Detail, & Parts List Motorola No. PEPS-34991-O (Sheet 2 of 2) 8/31/82 - V&G





COMPONENT VALUE TABLE			
COMPONENT	FREQU	ENCY RANG	E (MHz)
AFFECTED	30-36	36-42	42-50
C430	180	130	91
C432	390	250	175
C433	300	190	160
C438	56	39	24
C440	75	47	36
C441	220	180	60
C444	190	100	80
C445	80	56	47
C448	80	47	27
C449	150	150	130
C452	56	34	30
C453	220	220	120
C454	3.9	2.7	2.2
C456	49	34	30
C457	91	62	47
C459	24	24	82
C461	100	100	80
C463	.001	NOT USED	NOT USED
C464	15	30	NOT USED
E401			
E402			
L407			
L408		SEE	
L413	FC	DOT NOTE	
R425	1.2k	1.2k	3.9k
R428	39k	47k	39K
R431	33k	33k	22k
R433	56k	47k	47k
R437	100	100	NOT USED
R439	NOT USED IN THESE TWO RANGES 560		560

PARTS NOT IDENTIFIED BY VALUE, BUT EACH FREQUENCY RANGE HAS A DIFFERENT CHARACTERISTIC.

- R437 AND C464 ARE NOT USED O TLB8174A AND TLB8274A.
- R439 NOT USED ON TLB8172A/73 AND TLB8272A/73A. C459 CONN TO Q408 COLLECTOR.

ss R436.

storized voltmeters (11 megohm) not recommended.

d, voltages measured in respect to chassis ground.

d, capacitor values are in picofarads.

te-Line and PURC paging radios.

e control stations.

actory selected so that *Private-Line* deviation falls 00 Hz limits. See parts list for values.

902-5 is not connected to the transmitter interconnect

de inputs are applied via P401-6 or P902-5.

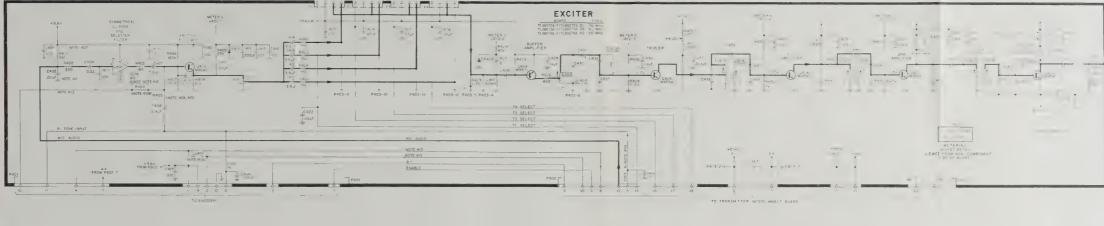
d only in flat audio stations.

at audio board is used.

gnal Name	With Flat Audio Option Signal Name
	IDC Limited Flat Audio
Keyed A+	Flat Audio
A+	Flat Audio Control

PARTS LIST SHOWN ON BACK OF THIS DIAGRAM TLB8170A & TLB8270A Series Exciter Schematic Diagram & Circuit Board Detail Motorola No. PEPS-16956-G 10/5/82 - V & G





AFFECTED 5	30-36	36-42	142 50
C430	180	130	91
C432	390	250	176
C433	300	190	160
C438	56	39	24
+ 440	70	47	
C441	220	180	
C444	190	100	80
C445	80	56	47
C448	80	47	
C449	150	150	130
C452	56	34	30
C453	220	220	120
€454	3.9	2.7	
C456	49	34	30
C457	91	52	47
C459	24	24	82
C461	100	100	80
C463	001	NOT USI	D NOT USED
C464	15	30	NOT USED
- 4			
*410			
4 "			
L408		SEE	
L413	FO	STON TOO	
R425	1.2%	1.2k	3.94
R428	39k	47k	(39×
R431	33k	33h	221
R433	56k	47k	471
R437	100	100	NOT USED
			560

COMPONENT VALUE TABLE

PARTS NOT IDENTIFIED BY VALUE BUT EACH FREQUENCY RANGE HAS A DIFFERENT CHARACTERISTIC

NOTES

401 Transmitter Frequency Calculation

tc = 3fo to = 1c

Where

fo = Channel Element Frequency

fc = Carrier Frequency

402 Voltage measured across R436

403 High Impedance transistorized voltmeters (11 megohm) not recommended

404 Unless otherwise stated, voltages measured in respect to chassis ground

405 Unless otherwise stated, capacitor values are in picolarads

406 JU401 removed in Private-Line and PURC paging radios

407 R401 removed in remote control stations

408 R404 and R405 are factory selected so that Private-Line deviation falls between 500 Hz and 1000 Hz limits. See parts list for values

409 In Private-Line radios, P902.5 is not connected to the transmitter interconnect

410 Remove R405 unless code inputs are applied via P401-6 or P902 5

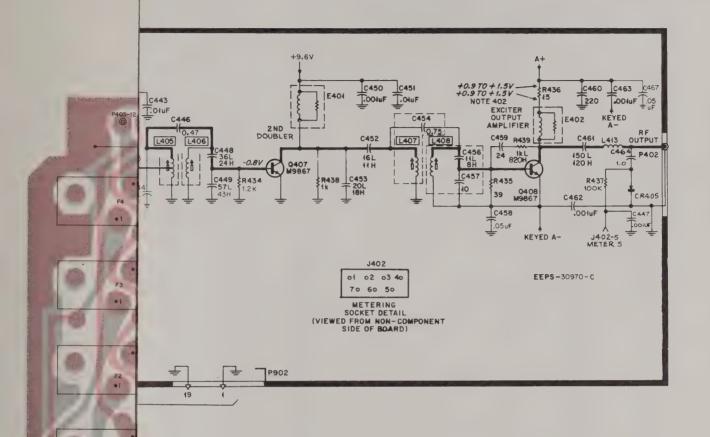
411 R402 and R403 removed only in flat audio stations

412 JU402 is added when flat audio board is used

413 With PL Squelch Signal Name With Flat Audio Option Signal Name P401-10 Code Input IDC Limited Flat Audio P401-4, 902-8 Delayer Keyed A + Flat Audio P401-2, 902-10 Keyed A + Flat Audio Control

PARTS LIST SHOWN ON BACK OF THIS DIAGRAM TLB8170A & TLB8270A Series Exciter Schematic Diagram & Circuit Board Detail Motorola No. PEPS-16956-G 10/5/82 - V & G





PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM TLD5321B and TLD5322B Exciters Schematic Diagram and Circuit Board Detail Motorola No. PEPS-30974-B

5/12/82 - V & G

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION		REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
PARTS LIST LEGEND C457M 21-84494B02 62					62	
		L = 30 - 36 MHz		C457H	2i-84494B44	47
	2724 Emiles (2)	M = 36 - 42 MHz 0-36 MHz) H = 42 - 50 MHz		C458 C459L, 459M	21-84494B41	NOT USED 24
I.B8173A/TLB8	273A Exciter (3)	6=42 MHz)	- 1	C459H	21-82610C20	82
LB8174A/TLB8	274A Exciter (4:	2-50 MHz) PL-5088-B		C460	21-83596E10	220 ±20% (TLB8172A/ TLB8173A/TLB8174A)
Board, Where	differences exis	models of the low band Exciter		C460	21-83596E13	.001 uF ±10% (TLB8272A/ TLB8273A/TLB8274A)
added to the ref	erence symbol o	or model number given in the		C461L, 461M	21-84494B04	100
Description col	umn to show the	applicable unit. CAPACITOR, fixed: pF ±5%;		C461H C462	21-84494B03 21-83596E13	.001 uF ±10%; 100 V
		500 V unless otherwise stated		C463L	21-83596E13	.001 uF ±10%; 100 V
C401	21-831125 21-82428B59	100 ±10%; 300 V ,01 uF +80-20%; 200 V		C464L C464M	21-840846	15 30
C402 C403	21-82428009	NOT USED		C468, 469	21-83596E13	.001 uF ±10% (TLB8272A/
C404	8-82905G11	, 22 uF ±10%; 50 V				TLB8273A/TLB8274A)
C405 C406	21-83596E13 21-82428B59	.001 uF ±10%; 100 V .01 uF +80-20%; 200 V	- 1	CR401	48-863030	DIODE: (SEE NOTE)
C407, 408	23-84762H08	3.9 uF ±20%; 15 V		CR402, 403		NOT USED
C409, 410	21-831125	100 ±10%; 300 V 0, 1 uF +80-20%; 25 V		CR 404	48-82139G01	germanium
C411 C412	21-82372C03 21-83596E10	220 ±20%		E401L, M	24-84392B12	COIL, rf: 40 turns on 330 ohm resistor
C413	21-82187B31	.0015 uF ±10%; 100 V		E401H	Z4-84392B08	18 turns on ZZO ohm resistor
C414	21-831125	100 ±10%; 300 V		E402L, M E402H	24-84392B11 24-84392B12	40 turns on 820 ohm resistor 40 turns on 330 ohm resistor
C415 C416, 417	21-83596E10	220 ±20% NOT USED		24000	0,1-043,12312	CONNECTOR, receptacle:
C418 thru 421	23-84762H08	3.9 uF ±20%; 15 V		J401		NOT USED
C422	21-82372C04 21-83596E10	.05 uF +80-20%; 25 V		J402	9-84207B01	7 contacts
C423 C424, 425, 426	21-82372C04	.05 uF +80-20%; 25 V				GOIL, rf: 18-2/3 turns; coded BLACK
C427	21-83406D51	3 ±0.25 pF		L401	24-84389B02	18-2/3 turns; coded BLACK
C428 C429	21-82133G06 21-82428B59	.01 uF +80-20%; 200 V		L402 L403	24-84389B01 24-84389B06	18-1/2 turns; coded YELLOW 8-2/3 turns; coded GREEN
C430L	Z1-84494B46	180 ±3%		L404, 405, 406	24-84389B05	8-1/2 turns; coded RED
C430M	21-84494B26	130		L407L, M	24-84389B07	10-1/2 turns; coded YELLOW 8-1/2 turns; coded RED
C430H C431	21-84494B52 21-83406D54	91 4 *0,25		L407H L408L, M	24-84389B05	10-1/2 turns; coded RED
C432L	21-84494B18	390		L408H	24-84389B05	8-1/2 turns; coded RED
C432M	21-859943 21-84494B09	250 175		L409	34 00000411	NOT USED
C432H C433L	21-84494B09 21-84494B15	300		L410 L411,412	24-80900A61 24-82835G08	0.62 mH 2.6 uH; coded RED-BLUE-
C433M	21-84494B10	190				GOLD
C433H C434, 435	21-84494B51	NOT USED		L413L, M L413H	24-84389B10 24-84389B08	12-1/3 turns; coded RED 10-1/3 turns; coded BLACK
C434, 435	21-82428B59	.01 uF +80-20%; 200 V		L413H	24-043041308	10-1/J turns; coded DLACK
C437	21-83596E13	.001 uF ±10%; 100 V				CONNECTOR, plug:
C438L C438M	21-84494B45 21-84494B24	56 39		P401 P402	28-84282D01	part of printed circuit board
C438H	21-84494B41	24		P403, 902	23-04202301	part of printed circuit board
C439 C440L	21-82450B18 21-84494B31	2 75		0401	48-869642	TRANSISTOR: (SEE NOTE) NPN; type M9642
C440L C440M	21-84494B44	47		Q401 Q402, 403	40-009042	NOT USED
C440H	21-84494B43	36		Q404	48-869571	PNP: type M9571
C441L C441M	21-84494B12 21-84494B46	220 180 ±3%		C405 O406	48-869534 48-869390	NPN: type M9534 NPN: type M9390
C441H	21-84494B35	00		Q407, 408	48-869591	NPN; type M9591
C442, 443	21-82428B59	.01 uF +80-20%; 200 V				RESISTOR, fixed: ±10%; 1/4 W
C444L C444M	21-84494B10 21-84494B04	190		R401	6-124C43	unless otherwise stated 560
C444H	21-84494B03	80		R402	6-124A37	330 ±5%
C445L C445M	21-84494B03 21-84494B45	80 56		R403	6-124A79 6-124A87	18k ±5%
C445M C445H	21-84494B45 21-84494B44	47			or6-121A89	39k Factory Selected 47k For DPL Models
C446	21-82450B13	1,5		R405	6-124A85	33k Factory Selected 47k For Tone PL Models
C447 C448L	21-83596E13 21-84494B03	.001 uF ±10%, 100 V		R406	0r6-124A89 6-124A99	47k For Tone PL Models
C448M	21-84494B44	47		R407	6-124B04	180k ±5%
C448H	Z1-84494B4Z	27		R408	6-124C73	10k
C449L, M G449H	21-84494B07 21-84494B26	150		R409	6-124C83 18-83083G24	27k variable: 25k ±30%
C450	21-83596E13	.001 uF ±10%; 100 V		R411 thru 418		NOT USED
C451	21-82428B50	.01 uF +80-20; 200 V		R419 thru 422	6-124A79 6-124C57	18k ±5% 2,2k
C452L C452M	21-84494B45 21-84494B52	50 34		R423 R424	6-124C89	47k
C452H	21-84494B33	3.)		R425 L	6-124C51	1. 2K
C453L, M	21-84494B12 21-84494B06	220 120		R425M R425H	6-124C51 6-124C63	1. 2k 3. 9k
C453H C454L	21-84494B06 21-82450B03	3.9 ±10%		R425H R426	6-124047	820
C454M	21-82450B32	2.7		R427		NOT USED
C454H C455	21-82450B17	2.2 NOT USED		R428L, H R428M	6-124C87 6-124C89	39k 47k
C456L	21-84494B25	49		R429M	6-124C57	2.2k
C456M	21-84494B30	34		R430	6-124C35	270
C456H C457L	21-84494B33 21-84494B52	30		R431L, M R431H	6-124C85 6-124C81	33k 22k
	01171274					

R432 R433L R433M,H 6-124C49 6-124C91 6-124C89 1k 56k 47k R434 R435 330 15 ±10% R436 R437L, M R438 R439H 100 ±5% NOT USED

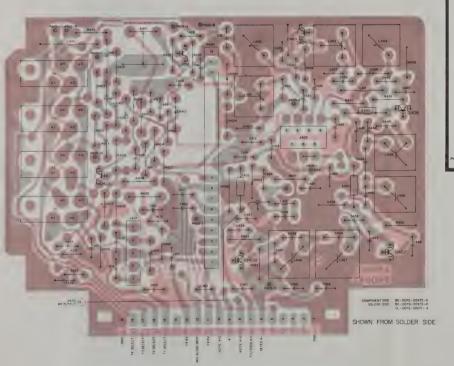
DESCRIPTION

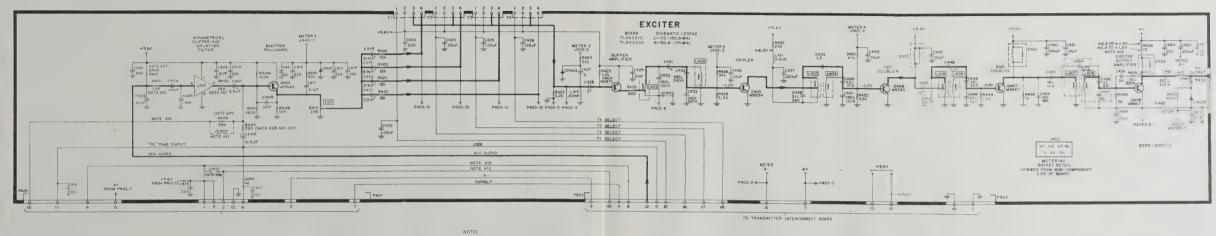
MOTOROLA PART NO

401	t-80763B05	AND SPLATTER FILTER- potted unit
1	NON-REFERENCE	D ITEMS
	14-861196	INSULATOR, transistor;
		2 used (used with Q407 & Q408)
	26-83379H01	HEAT SINK: 2 used
	26-84598A02	SHIELD, coil: 8 used
	42-84284B01	RETAINER: screw, 4 used
	3-138162	SCREW, tapping: 4-40 x 3/8";
	3-170102	4 used (used for mounting
		retainers)
	55-84300B01	HANDLE
	1-80767B48	CIRCUIT BOARD ASSEMBLY
		includes:
	29-855943	PIN, terminal: .385" lg:
		16 used
	29-84028H01	PIN, terminal: .800" lg.;
		19 used
	29-84028H02	PIN, terminal: .595" lg.;
	1	12 used
	39-10184A10	CONTACT, male: .058 x
		. 355"; 10 used
	1-80793B69	CABLE ASSEMBLY includes:
	30-83794C01	CABLE, coaxial: 8" lg.

For optimum performance, replacement diodes and transistors must be ordered by Motorola part numbers.

		REVISIONS PE	PS-16956-E
CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATIO
TLB8172A-1 TLB8173A-1 TLB8174A-1	R425	WAS 6-124C51, 1.2K	PARTS LIST
TLB8272A TLB8273A TLB8274A		NEW MODELS ADDED	
TI.B8174A-3 TLB8274A-1	C440H	FROM 21-84494B33. 30 pF TO 21-84494B43. 36 pF	
	C441H	FROM 21-84494B27, 140 pF TO 21-84494B35, 60 pF	





401 Transmitter Frequency Calculation

Where fo = Channel Element Frequency fc = Carrier Frequency

402 Voltage measured across R436

403 High impedance translatorized voltmeters (11 megohm) not recommended

404 Unless otherwise stated, voltages measured in respect to chassis ground

405 Unless otherwise stated, capacitor values are in picolarads

406 JU401 removed in Private-Line and PURC paging radios

407 R401 removed in remote control stations

408 R405 is removed unless code inputs are applied via P401-6 or P902-5.

409 R404 and R405 are factory selected so that Private-Line deviation falls between 500 Hz and 1000 Hz limits

410 R402 and R403 removed only in flat audio stations

411 JU402 is added when flat audio board is used

412. With PL Squeich Signal Name With Flat Audio Option Signal Name

P401-10 Code Input IDC Limited Flat Audio P401-4, 902-8 Delayed Keyed A + Flat Audio P401-2, 902-10 Keyed A + Flat Audio Control

5/12/82 - V & G

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM TLD5321B and TLD5322B Exciters Schematic Diagram and Circuit Board Detail Motorola No. PEPS-30974-B





parts list

TLD5321B Exciter (132-150.8 MHz) = L TLD5322B Exciter (150.8-174 MHz) = H REFERENCE MOTOROLA SYMBOL PART NO.

PL-7116-A DESCRIPTION

This parts list covers two models of the high band Exciter Board. Where differences

CADI	exist a letter suff	ix L or H is adde	d to the reference symbol to show the app
C401 21-831925 0.0 ± 10%; 300 V C402 21-83596E21 0.0 ± 10%; 300 V C403 8-82905G11 2.2 □ ± 10%; 50 V C406 21-83596E13 2.0 □ □ F ± 10%; 100 V C407 24-84784D68 3.0 □ □ F ± 10%; 100 V C408, 410 21-83125 100 ± 10%; 300 V C412, 413, 415 21-83596E10 3.0 □ □ F ± 20%; 15 V C414, 416, 417 21-83125 100 ± 10%; 300 V C414 21-834762H08 3.0 □ E ± 20%; 15 V C422 21-83596E10 3.0 □ E ± 20%; 15 V C432 21-83596E10 3.0 □ E ± 802, 0%; 25 V C423 21-83596E10 3.0 □ E ± 802, 0%; 25 V C424 22 ± 83268E3 20 □ 10%; 300 V C429 21-83596E13 3.0 □ E ± 80, 20%; 25 V C430 21-83496B18 20 □ 10%; 300 V C431 21-83496B18 21 □ 10 □ E ± 80, 20%; 25 V C432 21-83496B18 21 □ 10 □ E ± 80, 20%; 25 V C431 21-83496B13 240 C432 21-84494B13 240			capacitor, fixed: pF ± 5%; 500 V
C403 C405 C406 C410 C411	C401	21-831125	100 ± 10%: 300 V
C404 8-8299GS11 .001 UF ± 10%; 100 V C405 21-83596E13 .001 UF ± 80×20%; 200 V C407, 408 21-83196E21 .001 UF ± 80×20%; 200 V C409, 410 21-831122 .001 UF ± 80×20%; 25 V C414 21-831122 .001 UF ± 80×20%; 25 V C414 21-83596E10 .001 UF ± 80×20%; 25 V C414 21-84740H8 .39 UF ± 20%; 15 V C422 21-82872C10 .05 UF ± 80×20%; 25 V C423 21-83460E3 .39 UF ± 20%; 15 V C426 21-83460E3 .39 UF ± 80×20%; 25 V C427 21-83460E3 .3 ± 0.25 pF C430L 21-84494B07 150 C430L 21-84494B07 150 C431 21-84494B07 150 C431 21-84494B07 300 C431 21-84494B07 300 C431 21-84494B01 300 C432 21-84494B01 300 C433 21-84494B01 30 C439 21-84494B01 30 C439		21-83596E21	.01 uF +80-20%; 200 V
C406 21-83596E21 0.1 uF + 80-20%; 200 V C407, 408 21-831220 100 ± 10%; 300 V C414 21-831122 100 ± 10%; 300 V C414 21-83122 100 ± 10%; 300 V C414 21-8359610 20 ± 20%; 15 V C414 21-8359610 20 ± 20%; 15 V C422 21-82372010 30 uF ± 20%; 15 V C423 21-8359610 220 ± 10% C424 225-8272010 25 uF ± 80-20%; 25 V C428 21-83496051 27 500 V C429 21-83496051 150 C4301 21-84494807 150 C4301 21-84494807 150 C431 21-84494807 150 C431 21-84494807 150 C432 21-84494807 150 C433 21-84494816 30 C433 21-84494816 30 C434 21-84494816 30 C439 21-84494810 15 C439 21-84494810 51	C403	0.00000001	NOTUSED
C406 21-83596E21 0.1 uF + 80-20%; 200 V C407, 408 21-831220 100 ± 10%; 300 V C414 21-831122 100 ± 10%; 300 V C414 21-83122 100 ± 10%; 300 V C414 21-8359610 20 ± 20%; 15 V C414 21-8359610 20 ± 20%; 15 V C422 21-82372010 30 uF ± 20%; 15 V C423 21-8359610 220 ± 10% C424 225-8272010 25 uF ± 80-20%; 25 V C428 21-83496051 27 500 V C429 21-83496051 150 C4301 21-84494807 150 C4301 21-84494807 150 C431 21-84494807 150 C431 21-84494807 150 C432 21-84494807 150 C433 21-84494816 30 C433 21-84494816 30 C434 21-84494816 30 C439 21-84494810 15 C439 21-84494810 51		8-82905G11 21.83506E13	.22 uF ± 10%; 50 V
C412, 413, 413			.01 uF + 80-20%: 200 V
C412, 413, 413	C407, 408		3.9 uF ± 20%; 15 V
C412, 413, 413	C409, 410		100 ± 10%; 300 V
CA23		21-82372C03	0.1 uF +80-20%; 25 V
CA23	C412, 413, 415		100 ± 10% · 300 V
CA23	C418 thru 421		3.9 uF ± 20%: 15 V
CA23	C422	21-82372C10	.05 uF + 80-20%; 25 V
C427 21.83406D51 27.500 V C428 21.83406D51 27.500 V C429 21.83406D51 27.500 V C430H 21.84494807 150 C430H 21.844948061 120 C431 21.844948063 4 ± 0.25 pF C432 21.84494813 240 C432 21.84494813 240 C433 21.84494813 240 C433 21.84494804 180 ± 3% C436 21.83596E21 0.01 uF ± 80.20%; 200 V C437 21.83494801 30 C438 21.84494804 39 C439 21.84494804 39 C439 21.84494804 190 C440L 21.8628881 47 C441L 21.84494810 190 C441L 21.84494810 190 C441L 21.84494810 190 C441L 21.84498162 19 C441L 21.84498163 19 C442 21.84348666 10	C423	21-83596E10	220 ± 10%
CA301. 21-84494805 100 100 100 100 100 100 100 100 100 1	C424, 425, 426	21-82872010	.05 uF + 80-20%; 25 V
CA301. 21-84498005 120 CA321. 21-84498163 330 CA321. 21-84498163 340 CA321. 21-84498173 240 CA331. 21-84498173 340 CA31. 21-84498173 340 CA31. 21-84498173 39 CA31. 21-84498173 15 107 107 107 107 107 107 107 107 107 107	C428	21-83406D51	27: 500 V
CA301. 21-84498005 120 CA321. 21-84498163 330 CA321. 21-84498163 340 CA321. 21-84498173 240 CA331. 21-84498173 340 CA31. 21-84498173 340 CA31. 21-84498173 39 CA31. 21-84498173 15 107 107 107 107 107 107 107 107 107 107		21-83596E21	.01 uF + 80-20%; 200 V
CA31 21-8434616 4 ± 0.25 pF CA32H 21-84494613 330 CA32H 21-84494613 240 CA33H 21-84494646 100 239 CA37 21-83596E13 240 CA38H 21-84494646 101 21 ± 10%; 100 V CA38H 21-84494610 51 CA38H 21-84494610 51 CA38H 21-84494610 51 CA38H 21-84494610 151 CA39H 21-8646961 170 CA41H 21-868681 47 CA41L 21-868681 170 CA41L 21-868681 170 CA41H 21-868681 170 CA41H 21-861681 130 CA42H 21-851661 130 CA42H 21-851661 130 CA44H 21-851661 100 CA42H 21-851661 100 CA44L 21-853661 22 CA44B 21-853661 200 CA44B 21-8246656 24 CA44B 21-8346656 24 CA48L 21-8346656 24 CA48L 21-8346656 24 CA48L 21-8346656 20 CA48L 21-8346656 100 100 F± 10%; 100 V CA51 21-8346656 100 10 F± 10%; 100 V CA51 21-834665 100 10 F± 10%; 100 V CA51 21-8346656 100 10 F± 10%; 100 V CA51 21-834665 100 10 F± 10%; 100 V CA51 21-8346656 100 10 F± 10%; 100 V CA51 21-8346656 100 10 F± 10%; 100 V CA51 21-8346656 100 10 F± 10%; 100 V CA52		21-84494B07	
C432L 21-84494B13 330		21-84494B06	120
C432H 218-4494813 240 C433H 218-4494846 180 ± 3% C434 435 218-3596E21 180 ± 3% C436 218-3596E21 300 uF ± 10%; 100 V 200 V C438 218-3596E21 300 uF ± 10%; 100 V 200 V C439 218-34434E24 39 200 uF ± 10%; 100 V C440L 218-3596E21 15 ± 10% 62 C440L 218-3596E21 190 10 uF ± 80 ± 20%; 200 V C441L 218-3493E26 22 10 uF ± 80 ± 20%; 200 V C441L 218-3493E26 22 10 uF ± 80 ± 20%; 200 V C441L 218-3496E26 22 10 uF ± 80 ± 20%; 200 V C444H 218-3496E26 22 10 uF ± 10%; 100 V C445 218-3169E34 470 ± 10%; 100 V 10 uF ± 10%; 100 V C448L 218-3496E96 24 24 C449L 218-3496E31 57; 200 V 24 C449L 218-3496E31 57; 200 V 24 C449L 218-3496E36 24		21-83406D54	4 ± 0.25 pF
C433L 21-84494813 240 C434, 435 C434, 435 C436, 435 C437 21-83596E21 0.01 uF ± 90.20%; 200 V C437 21-83596E31 0.01 uF ± 10%; 100 V C438L 21-84494801 51 C438H 21-84494802 39 C439 21-861483 15 ± 10% C439H 21-86494810 190 C441L 21-8649810 190 C441H 21-868681 190 C441H 21-868681 190 C441H 21-8649810 190 C441H 21-8649810 190 C441H 21-8649810 190 C441H 21-8649310 190 C441H 21-83496055 18 C442 443 21-83496055 18 C444 21-83496055 18 C446 21-8245931 55; 200 V C448L 21-83496090 101 C448L 21-83496090 101 C453L 21-83496090 101 C453H 21-83496090 101 C453L 21-8349		21-84494B10 21-84494B13	
C433H 218-84494E46 18 ± 3 % NOT USED C436 21-83596E21 .001 μF ± 80-20%; 200 V C437 21-83596E13 .001 μF ± 80-20%; 200 V C438L 21-84494E01 39 C439 21-84494E01 39 C439 21-8454E13 15 ± 10% C440L 21-8648151 15 ± 10% C441L 21-844911 190 C441 21-8449611 190 C441 21-8449611 190 C441 21-8449612 21 C444 21-8449613 20 C444 21-8449613 20 C444 21-8449613 20 C444 21-8449613 470 C444 21-8449613 470 C446 21-82450817 470 C447 21-8449613 470 C448 21-83466196 24 C449L 21-84493831 001 μF ± 10%; 100 V C448 21-83466196 24 C451 21-834	C433L	21-84494B13	240
C436 21-83596E21 .001 uF ± 10%; 100 V C438L 21-84494B01 .001 uF ± 10%; 100 V C438L 21-84494B01 39 C439 21-84494B01 39 C439 21-8454B24 39 C440L 21-852322 62 C440H 21-88494B10 100 C441L 21-84494B10 100 C442 43 21-83596E21 101 uF + 80-20%; 200 V C444 21-84498160 100 C442 43 21-8346613 101 uF + 80-20%; 200 V C444 21-8346613 0.00 uF ± 10% C446 21-82450837 0.47 C447 21-8346613 0.00 uF ± 10%; 100 V C448L 21-8346613 0.00 uF ± 10%; 100 V C448L 21-8346613 0.00 uF ± 10%; 100 V C449L 21-84493831 0.00 uF ± 10%; 100 V C449L 21-84493831 0.00 uF ± 10%; 100 V C451 21-8346613 0.01 uF ± 10%; 100 V C452 21-8346613 0.01 uF ± 10%; 100 V<			
C437 21-8596E13 .001 uF ± 10%; 100 V C438H 21-84494B24 51 C439H 21-84494B24 39 C440L 21-851453 1.5 ± 10% C440L 21-852322 62 C441H 21-858881 47 C441L 21-84948101 100 C441L 21-844948101 101 C442, 443 21-85968E21 101 UF + 80-20%; 200 V C444L 21-84493826 22 C444L 21-84493826 18 C445 21-82167845 101 C446 21-82469837 0.47 C447 21-83466093 36 C448H 21-83466093 301 uF ± 10%; 100 V C448J 21-8449828 301 uF ± 10%; 100 V C449L 21-8449828 301 uF ± 10%; 100 V C449L 21-8449828 301 uF ± 10%; 100 V C452L 21-8449828 301 uF ± 10%; 100 V C452L 21-8449828 301 uF ± 10%; 100 V C452L 21-8449828	C434, 435		NOTUSED
C438L 218-84948010 51 C438H 218-84948124 39 C439 218-81453 1.5 ± 10% C440L 218-82322 62 C440H 218-85881 47 C441L 218-8494810 190 C441H 218-858621 101 F + 80-20%; 200 V C442, 443 218-859625 107 ± 10% C444L 218-84938265 107 ± 10% C444L 218-8366055 107 ± 10% C446 218-82450837 0.47 C447 218-8366056 24 C448L 218-8366056 24 C449L 218-83460593 3.00 u F ± 10%; 100 V C448L 218-83460596 24 C449L 218-83460596 24 C453L 218-83460590 10 u F ± 60-20%; 200 V C453L 218-83460590 11 C453L 218-83460590 11 C453H 218-83460505 18 C445 218-83460500 10 C453H	C436	21-83596E21	.01 uF + 80-20%; 200 V
C438H 218-84494824 39 C440L 21-85483 1.5 ± 10% C440L 21-852322 82 C441L 21-856881 47 C441L 21-85681 190 C442L 21-851801 130 C442L 21-851801 130 TuF + 80-20%; 200 V C444L 21-85396E21 22 C445 21-82489836 22 C446 21-82489837 0.470 ± 10% C447 21-83466937 0.470 ± 10%; 100 V C448L 21-8346693 36 C448H 21-8346693 36 C449L 21-84498283 57; 200 V C449L 21-84498283 300 uF ± 10%; 100 V C491 21-8346693 16 C491 21-8346693 16 C451 21-8346693 16 C452 21-8346693 16 C451 21-8346693 16 C452 21-8346693 16 C453 21-8346693 16		21-83596E13	.001 uF ± 10%; 100 V
C439 21-861453 1.5 ± 10% C440L 21-868681 47 C441L 21-84849810 190 C441H 21-84849810 190 C441H 21-8489810 190 C444L 421-84493828 22 C444L 21-84898055 10° C444L 21-84898055 10° C446 21-82450837 10° C446 21-82450837 10° C447 21-83466193 30° C448L 21-83466193 30° C448L 21-83466196 24 C449L 21-84493831 30° C450 21-83466196 24 C449L 21-84493831 30° C450 21-83466196 24 C451 21-83466190 11° C452 21-83466190 11° C4531 21-83466190 11° C4531 21-83466190 10° C4531 21-83466190 10° C4531 <td></td> <td>21-84494BUT 21-84494R24</td> <td>39</td>		21-84494BUT 21-84494R24	39
C440L 21-852322 62 C440H 21-856881 47 C441L 21-84494810 130 C442, 443 21-8539621 130 C442, 443 21-8539621 130 C442, 443 21-8539621 130 C442, 443 21-8539621 22 C445 21-82187845 470 ± 10% C446 21-8249813 22 C446 21-8249813 170 0.7 C447 21-83596613 0.01 uF ± 10%; 100 V C481 21-83496192 36 C448H 21-83496192 36 C448H 21-83496193 157; 200 V C449L 21-84494828 157 C449 12-84494828 157 C449 12-84494828 160 C451 21-83496193 16 C452 21-82496195 18 C453 21-82496195 18 C454 21-82496195 18 C454 21-83496193 16 C455 21-83496193 16 C456 21-83496193 10 ± 0.5 pF C457 21-83496193 10 ± 0.5 pF C458 21-83496190 10 ± 0.5 pF C459 21-83496190 10 ± 0.5 pF C459 21-83496190 10 ± 0.5 pF C459 21-83496190 10 ± 0.5 pF C469 21 ± 0.5 pF C469 21 ± 0.5 p			1.5 ± 10%
C441L 21-84494810 190 C442, 443 21-85596E21 130 C442, 443 21-8596E21 22 C444H 21-84498266 22 C444H 21-83406D55 470 ± 10% C447 21-83506E13 470 ± 10% C447 21-83506E13 0.01 uF ± 10%; 100 V C448L 21-83406D56 24 C448L 21-83406D59 36 C448L 21-83406D59 24 C449L 21-84494B28 43 C450 21-83496D59 16 C451 21-83496D59 16 C452L 21-83496D59 11 C452H 21-83496D59 12 C452H 21-83496D59 11 C452L 21-83496D59 12 C453L 21-82450B06 175 ± 10% C454 21-82460B09 11 C455 21-83496D59 12 C456 21-83496D69 12 C457 21-83496D69 11		21-852322	62
C441H 21-8596E21 .01 uF +80-20%; 200 V C444L 21-84493E26 2 C444L 21-84493E26 12 C444L 21-84493E26 18 C445 21-8249E837 0.470 ± 10% C446 21-8249E837 0.470 ± 10%; 100 V C447 21-8349E122 30 C448 21-8349E22 32 C449L 21-84493B31 57; 200 V C448H 21-84493B31 57; 200 V C451 21-83496E93 43 C450 21-83496B93 101 uF ± 10%; 100 V C451 21-83496B93 11 C452L 21-83496B90 11 C453L 21-83496B90 11 C453L 21-83496B90 11 C453 21-83496B90 10 C454 21-83496B90 10 C456 21-83496B90 10 0.5 pF C457 21-83496B90 10 0.5 pF C458 21-83296B10 0.5 ± 20%; 25 V		21-868681	
C4441 21-834981962 2 C4441 21-844981926 2 C4441 21-844981926 18 C446 21-824850837 0.47 C446 21-824850837 0.47 C446 21-824850837 0.47 C447 21-83596E13 0.07 □ ± 10%; 100 ∨ C4481 21-83406195 36 C4481 21-83406195 24 C4491 21-83406195 24 C4491 21-83406195 10 □ □ ± 10%; 100 ∨ C4481 21-83406195 10 □ □ ± 10%; 100 ∨ C481 21-83406190 11 C4821 21-83406190 11 C4821 21-83406190 11 C4821 21-83406190 11 C4831 21-83406190 10 C4840 21-8358611 0.00 □ ± 10%; 100 ∨ C4861 21-83406190 10 ± 5.5 pF C486 21-83737201 0.5 ± 20%; 25 ∨ C489 21-8373201 0.5 ± 20%; 25 ∨ C489 21-83408190 10 ± 0.5 pF C480 21-8358611 0.00 □ ± 10%; 100 ∨ C481 21-84484800 10 C480 21-8358611 0.00 □ ± 10%; 100 ∨ C481 21-84484800 10 C480 21-8358611 0.00 □ ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± 10%; 100 ∨ C4804 21-8358611 0.00 □ ± ± ± ± ± ± ± ± ± ± ± ± ± ± ± ± ± ±		21-84494B10	190
C444L 21-84493926 22 C444F 21-83406055 18 C445 21-82187845 70 ± 10% C446 21-8248087 0.470 ± 10%; 100 V C447 21-834806059 36 C448L 21-834806059 36 C448L 21-834806059 36 C448L 21-83480603 37, 200 V C449H 21-84484828 43 C450 21-83596E13 0.01 uF ± 10%; 100 V C451 21-83406090 11 C452L 21-83406090 11 C453IL 21-83406090 11 C453L 21-83406090 11 C453 21-83406090 17 C454 21-83406090 11 C456 21-83406090 15 C458 21-83406090 15 C458 21-83406090 15 C459 21-83496090 15 C469 21-83496090 15 C469 21-83496090 16	C441H	21-861601	01 (15 ± 80 20% · 200 V
C444H 218-30460555 18 C445 218-2187945 470 ± 10% C446 218-22450837 0.47 C447 218-35466563 36 C448L 218-35466565 24 C449L 218-3466565 24 C449L 218-4493831 30 ur ± 10%; 100 v C449L 218-348622 30 ur ± 10%; 100 v C430 218-358623 30 ur ± 10%; 100 v C431 218-3466593 10 ur ± 80-20%; 200 v C452 218-3466590 10 ur ± 80-20%; 200 v C452 218-3466591 20 ur ± 80-20%; 200 v C453 218-3466591 20 ur ± 10% C453 218-3466591 20 ur ± 10% C455 218-3466590 0.75 ± 10% C456 218-3466590 0.75 ± 10% C457 218-3466591 10 ± 0.5 pF C458 218-3272010 0.5 ± 20%; 25 v C459 218-3496679 220 ± 20 C469 218-3494807 150 C461 218-3494800	C444I.		22
C447 2183596E13 001 uF ± 10%; 100 V C448L 2183466D56 24		21-83406D55	
C447 2183596E13 001 uF ± 10%; 100 V C448L 2183466D56 24	C445	21-82187845	470 ± 10%
C448L 21:83406092 36 C448JH 21:83406093 36 C449L 21:844493831 57; 20 V C449H 21:84494828 43 C450 21:83596E13 .001 uF ± 10%; 100 V C451 21:83548099 11 C452L 21:83480999 11 C453L 21:83480999 11 C453L 21:83480999 11 C453L 21:83480999 11 C453L 21:8348099 10 C453L 21:8348099 11 C453L 21:8348099 11 C453L 21:8349099 11 C454 21:8349090 11 C454 21:83496090 11 C457 21:83496090 10 15 F C458 21:8329609 10 10.5 pF C459 21:8406070 52 ±20%; 25 V C459 21:8439400 75 C461 21:84349407 150 C462, 43 21:8359621		21-82450B37	
C448 H 21-83406D56 24 C449 L 21-844981831 37, 200 V C449 L 21-844941828 3.001 uF ± 10%; 100 V C451 21-83596E21 .001 uF ± 80.20%; 200 V C452 L 21-83406D93 16 C452 L 21-83406D93 16 C452 L 21-83406D93 16 C452 L 21-83406D93 16 C454 L 21-83406D95 12 C454 L 21-83406D95 12 C455 L 21-83406D96 17 C457 21-83406D96 17 C457 21-83406D98 10 ± 0.5 pF C458 21-834706D98 10 ± 0.5 pF C458 21-834706D98 10 ± 0.5 pF C459 21-83406D99 10 ± 0.5 pF C459 21-834596E10 .05 ± 20%; 25 V C460 21-83596E10 .05 ± 20%; 25 V C461 21-83596E10 .05 ± 20%; 25 V C462 482 483 21-83506B9 .00 ± 10 ± 10 ½ 10 V C464 21-82355B62 .00 ± 10 ± 10 ½ 10 V C465 21-82187B06 .00 ± 20 ± 20% C467 21-82372C10 .05 ± 20 ½; 25 V C460 21-82359B99 .00 ± 20 ± 20 ½; 25 V C460 21-82359B99		21-83596E13	.001 uF ± 10%; 100 V
C449L 21-84493831 43 57; 200 V C49H C49H C49H C49H C49H C49H C49H C49H		21-83406D56	
CA49H 21-8444484828 43 43 43 43 43 43 43 43 43 43 43 43 43			57; 200 V
C451 21-83566E21 21-83466P33 16 C452H 21-83466P33 16 11 C453H 21-83466P31 20 11 C453H 21-83466P31 20 18 C453H 21-83466D31 20 18 C454 21-83466D70 8 10 10 C456H 21-83466D70 8 ± 0.5 pF 20 11 20 12 C457 21-83466D80 10 ± 0.5 pF 20			43
C452L 21-83406693 16 C453L 21-83406990 11 C453L 21-83406955 18 C454 21-83406955 18 C454 21-83406901 17 C458L 21-83406901 17 C458L 21-83406901 18 C458L 21-83406901 18 C458L 21-83406901 18 C458L 21-83406901 19 C458L 21-83406901 19 C458L 21-83406901 10 C458L 21-8349601 10 C458L 21-8349601 10 C458L 21-8349601 10 C469L 21-8359661 10 C461 21-8349606 12 C461 21-8349606 10 C462 48 21-83256962 10 C464 21-82356962 10 C465 21-82187806 560 C466 21-82187806 560 C467 21-8237201 05 20%;25 V diode: (see note) germanium NOT USED C461 24-84392805 15 C461 24-84392805 15 C461 24-84392805 15 C461 24-84392805 15 C461 24-84392806 15 C461 24-84398806 18 C461 24-84398806 18 C461 24-84398806 18 C461 24-84388806 18 C46		21-83596E13	.001 uF ± 10%; 100 V
C452H 21-83406D90 11 C453H 21-83406D91 20 C453H 21-83406D95 21 C453H 21-83406D95 21 C454 21-8249006 0.75 ± 10½ C455		21-83596E21	.01 uF + 80-20%; 200 V
C453L 21-83406D81 20 C453H 21-83406D85 18 C454 21-8249806 0.75 ± 10% C455 21-83406D90 11 C456H 21-83406D80 1± 0.5 pF C457 21-83406D89 1± 0.5 pF C458 21-82372C10 .05 ± 20% 25 V C480 21-82596E10 .05 ± 20% 25 V C480 21-82596E10 .05 ± 20% 20% C480 21-84596E10 120 20% C481 21-84494B07 150 20% C481 21-84494B07 150 20% C481 21-84394B07 150 20% C481 21-84394B07 150 20% C481 21-84394B08 100 12 ± 10%; 100 V C482 43 21-82355B81 .001 uf ± 10%; 100 V C485 21-82187B06 20 0 0 C486 21-82187B06 20 0 0 0 C7467	C452L C452H	21-83406090	
C454 21-82459806 0.75 ± 10% C455 L 21-83466D90 11 1 C456L 21-83466D70 8 ± 0.5 pF C457 21-83466D80 10 ± 0.5 pF C458 21-82372C10 0.5 ± 20%; 25 V C458 21-82372C10 0.5 ± 20%; 25 V C458 21-82372C10 10 ± 0.5 pF C458 12 1-84596E10 10 ± 0.5 pF C458 12 1-84596E10 10 0.5 ± 20%; 25 V C451 12 1-84494B07 150 C451 11 21-84494B07 150 C451 11 21-84494B07 150 C452 11 21-84596E10 10 0.00 10 ± ± 10%; 100 V C454 21 2235596E1 0.00 10 ± ± 10%; 100 V C454 21 21-8235596E1 0.00 10 ± ± 10%; 100 V C456 21 1-82187806 10 0.00 10 ± ± 10%; 100 V C456 21 1-82187806 20 0.00 10 ± ± 10%; 100 V C456 21 1-82187806 20 0.00 10 ± ± 10%; 100 V C457 21 1-82372C10 0.00 10 ± ± 10%; 100 V C458 21 1-82187806 20 0.00 10 ± ± 10%; 100 V C458 21 1-82187806 20 0.00 10 ± ± 10%; 100 V C458 21 1-82187806 20 0.00 10 ± ± 10%; 100 V C458 21 1-82187806 20 0.00 10 ± ± 10%; 100 V C458 21 1-82187806 20 0.00 10 ± ± 10%; 100 V C458 21 1-82187806 20 0.00 10 ± ± 10%; 100 V C458 21 1-82187806 20 0.00 10 ± ± 10%; 100 V C458 21 1-82187806 20 0.00 10 ± ± 10%; 100 V C458 21 10	C453L	21-83406D81	
C456L 21-83406D90 11		21-83406D55	
C456L 21-83406D90 11		21-82450B06	0.75 ± 10%
C456H 21-83406D70 8 ± 0.5 pF C457 21-83406D89 10 ± 0.5 pF C458 21-82372C10 0.5 ± 20%; 25 V C459 21-840365 24; NP0 C460 21-83596E10 220 ± 20% C4611 21-84494B07 150 C462, 463 21-83596E13 .001 uF ± 10%; 100 V C462 21-83595B62 10 C466 21-823595B62 NOT USED C467 21-823700 .05 ± 20%; 25 V C467 21-823700 .05 ± 20%; 25 V CR401 48-883030 germanium CR404, 405 48-82139G01 yermanium CR405 48-82139G01 15 turns on 580 ohm resistor E4021 24-84392B05 40 turns on 580 ohm resistor E4021 24-84392B05 40 turns on 160 ohm resistor E4031 24-84392B06 40 turns on 10 ko hm resistor E4031 24-84398505 27 orontacts L401 24-84388B02 28-27 turns; coded BLK L402 24-84388B04 18-12		21 92406000	NOT USED
C457 21-83/406089 10 ± 0.5 pF C459 21-83/272C10 0.5 ± 20%; 25 V C459 21-83/59E10 0.5 ± 20%; 25 V C4611 21-84/494007 150 100 V C4612 21-84/494007 150 0.01 uf ± 10%; 100 V C462 483 21-83/59E613 1.0 NOT USED NOT USED C465 21-8218/7806 560 21.0 10 Uf ± 10%; 100 V C466 21-8218/7806 560 21.0 NOT USED NOT USED NOT USED C7467 21-823/72C10 0.5 ± 20%; 25 V diode: (see note) germanium NOT USED C7402 403 (24.64398001 150 um so 830 ohm resistor 15 um so n 830 ohm re	C456H	21-83406D70	
C459 21-84085 24; NPO C460 21-85596E10 220 ± 20% C4611 21-84494B07 150 C4612 41-84494B07 150 C462 483 21-83596E13 2.00 1 uf ± 10%; 100 V C464 21-823556B2 1.0 NOT USED C465 C467 21-82372C10 .05 ± 20%; 25 V CR401 48-863030 germanium CR402, 403 48-82139G01 germanium CR402, 403 48-82139G01 germanium CR404 405 48-82139G01 germanium CR402 403 24-84382B13 40 turns on 580 ohm resistor E4021 24-84382B13 10 turns on 580 ohm resistor E4021 24-84382B13 40 turns on 580 ohm resistor E4021 24-84382B13 40 turns on 580 ohm resistor E4021 24-84382B13 24 turns on 580 ohm resistor E4021 24-84388B0 E4021 24-84388B00 E4021 24-8438B00 E403 24-8438B00 E412 turns; coded BLK E403 24-8438B00 E412 turns; coded GRD E403 24-8438B00 E412 turns; coded GRD E404 E408 ED E404 E408 ED E405 E408 E408 E408 E408 E408 E408 E408 E408		21-83406D89	10 ± 0.5 pF
C480 21-83596E10 220 ± 20% C481L 21-84494B07 150 C481H 21-84494B06 120 C482,483 21-83596E13 .001 uf ± 10%; 100 V C464 21-82355862 1.0 C465 21-82187806 50 C466 21-82187806 50 C467 21-8237201 .05 ± 20%; 25 V CR401 48-863030 MOT USED CR404,405 48-82139G01 germanium NOT USED ocil, rt E401 24-84392B08 40 turns on 820 ohm resistor E4021 24-84392B05 15 turns on 560 ohm resistor E4021 24-84392B05 27 und coded RED BLU-GLD E4031 24-82895G08 27 und coded RED BLU-GLD J401 24-84389B02 28-27 urns; coded BLK L402 24-84389B05 8-72 turns; coded GRN L403 24-84389B06 8-72 turns; coded GRN L404 24-84389B06 8-72 turns; coded GRN			.05 ± 20%; 25 V
C461L C461L C461H C462, 463 C462, 463 C465 C466 C467 C466 C467 C467 C467 C467 C467	C459		
C461H 21-84494906 120 C462, 463 21-83596E13 .001 uf ± 10%; 100 V C464 21-82365962 1.0 C465 21-82187806 NOT USED C466 21-82187806 20 C467 21-8237201 .05 ± 20%; 25 V CR401 48-863030 germanium CR404, 403 48-82139G01 germanium CR401 24-84392806 germanium E401 24-84392805 9 turns on 580 ohm resistor E402H 24-84392805 9 turns on 580 ohm resistor E403H 24-84392805 9 turns on 580 ohm resistor 2403H 24-84392806 2 turns on 160 ohm resistor 2401 24-84389800 2 turns on 160 ohm resistor 2401 24-84389800 2 turns on 160 ohm resistor 2401 24-84389800 2 turns on 560 ohm resistor		21-83596E10	220 ± 20%
C484_483			
C464 21-82:355962 1.0 C465 21-92:187806 C66		21-83596E13	.001 uF ± 10%; 100 V
C466 21-82/18/1606 500 C467 21-82/372C10 500 500 C7401 48-863030	C464	21-82355862	1.0
CR401 21-82372C10 .0.5 ± 20%; 25 V diode: (see note) germanium NOT USED germanium NOT USED coll, rf: 48-82139G01 Coll, rf: 48-82139E01 Set 24-84392B05 Set 24-84392B05 Set 27 Unra on 580 ohm resistor 15 turns on 560 ohm	C465		NOT USED
CR401			560 05 + 20%/ : 25 \/
CR401 48-883030 germanium CR404, 405 48-82139G01 germanium CR402, 48-84392B06 401, rt. E401 24-84392B15 15 turns on 580 ohm resistor E4021 24-84392B15 9 turns on 580 ohm resistor E4021 24-84392B15 9 turns on 580 ohm resistor E4021 24-84392B18 40 turns on 10k ohm resistor E4034 24-84392G18 40 turns on 10k ohm resistor E4031 24-84385G08 27, unded RED-BLU-GLD connector, receptacle: NOT USED 7 contacts coil, rf: L401 24-84389B02 18-273 turns; coded BLK L402 24-84389B01 18-273 turns; coded GRN L403 24-84389B05 8-172 turns; coded GRD	G467	21-82372010	.05 ± 20%; 25 V
CR401 48-883030 germanium CR404, 405 48-82139G01 germanium CR402, 48-84392B06 401, rt. E401 24-84392B15 15 turns on 580 ohm resistor E4021 24-84392B15 9 turns on 580 ohm resistor E4021 24-84392B15 9 turns on 580 ohm resistor E4021 24-84392B18 40 turns on 10k ohm resistor E4034 24-84392G18 40 turns on 10k ohm resistor E4031 24-84385G08 27, unded RED-BLU-GLD connector, receptacle: NOT USED 7 contacts coil, rf: L401 24-84389B02 18-273 turns; coded BLK L402 24-84389B01 18-273 turns; coded GRN L403 24-84389B05 8-172 turns; coded GRD			diode: (see note)
CR404, 405		48-863030	germanium
E401 24-84392806 40 turns on 820 ohm resistor E402L 24-84392813 15 turns on 580 ohm resistor 15 turns on 580 ohm resistor 1403L 24-84392805 27 ohr coded RED BLU-GLD Connector, receptacle: NOT USED 7 contacts 7 contacts 24-84389802 27 ohr coded BLK 18-27 surns; coded BLK 18-403 24-84389805 16-172 turns; coded GRN 18-404 24-84389805 8-172 turns; coded GRD 18-28 turns	CR402, 403		
E401 24-84392806 40 lurns on 820 hm resistor E4021 24-84392805 15 turns on 560 hm resistor E4021 24-84392805 29 turns on 560 hm resistor E4031 24-84392618 40 turns on 10k hm resistor E4031 24-8283508 27 rul coded RED BLU-GLD J401 3402 9-84207801 7 contacts Coll, rt Coll, rt L401 24-84389802 18-273 turns; coded BLK L402 24-84389805 18-172 turns; coded GRN L403 24-84389805 8-172 turns; coded GRN L404 24-84389805 8-172 turns; coded GRN L405 RED STAN RED	CR404, 405	48-82139G01	germanium
E401 24-84392806 40 lurns on 820 hm resistor E4021 24-84392805 15 turns on 560 hm resistor E4021 24-84392805 29 turns on 560 hm resistor E4031 24-84392618 40 turns on 10k hm resistor E4031 24-8283508 27 rul coded RED BLU-GLD J401 3402 9-84207801 7 contacts Coll, rt Coll, rt L401 24-84389802 18-273 turns; coded BLK L402 24-84389805 18-172 turns; coded GRN L403 24-84389805 8-172 turns; coded GRN L404 24-84389805 8-172 turns; coded GRN L405 RED STAN RED			coll rf:
E402L 24-84382B13 15 turns on 560 hm resistor E402H 24-84382B05 9 turns on 560 hm resistor 9 turns on 560 hm resistor 24-84382B13 40 turns on 10k hm resistor 2.7 uH coded RED-BLU-GLD connector, receptacle: NOT USED J402 9-84207B01 7 contacts coll, rf: L401 24-84389B05 18-273 turns; coded BLK 18-12 turns; coded GRN L403 24-84389B06 8-172 turns; coded GRN L404 24-84389B05 8-172 turns; coded GRN L604 24-84389B05 8-172 turns; coded GRN L604 24-84389B05 8-172 turns; coded RED	E401	24-84392B06	40 turns on 820 ohm resistor
E402H 24-84382805 9 turns on 560 ohm resistor			15 turns on 560 ohm resistor
24-82835G08 2.7 uH coded RED-BLU-GLD		24-84392B05	9 turns on 560 ohm resistor
JA01 JA02 9-84207B01 Connector, receptacle: NOT USED 7 contacts coll, rf: L401 24-84389B02 E-2/3 turns; coded BLK L402 24-84389B06 8-1/2 turns; coded GRN L403 24-84389B06 8-1/2 turns; coded GRN L404 24-84389B05 8-1/2 turns; coded RED			40 turns on 10k ohm resistor
J402 9-84207801 7 contacts coll, rf: L401 24-84389B02 18-2/3 turns; coded BLK L402 24-94389B00 18-1/2 turns; coded GRN L403 24-94389B06 8-1/2 turns; coded GRN L404 24-94389B05 8-1/2 turns; coded GRN	E403H	24-82835G08	2.7 UN COORD NED-BLU-GLD
J402 9-84207801 7 contacts coll, rf: L401 24-84389B02 18-2/3 turns; coded BLK L402 24-94389B00 18-1/2 turns; coded GRN L403 24-94389B06 8-1/2 turns; coded GRN L404 24-94389B05 8-1/2 turns; coded GRN			connector, receptacle:
J402 9-84207801 7 contacts coll, rf: L401 24-84389B02 18-2/3 turns; coded BLK L402 24-84389B00 18-1/2 turns; coded GRN L403 24-84389B06 8-1/2 turns; coded GRN L404 24-84389B05 8-1/2 turns; coded GRN	J401		NOT USED
L401 24-84399B02 18-2/3 turns; coded BLK L402 24-84389B01 18-1/2 turns; coded YEL L403 24-84389B06 8-2/3 turns; coded GRN L404 24-84389B05 8-1/2 turns; coded RED	J402	9-84207B01	
L401 24-84399B02 18-2/3 turns; coded BLK L402 24-84389B01 18-1/2 turns; coded YEL L403 24-84389B06 8-2/3 turns; coded GRN L404 24-84389B05 8-1/2 turns; coded RED			anii si
L402 24-84389B01 18-1/2 turns; coded YEL L403 24-84389B06 8-2/3 turns; coded GRN L404 24-84389B05 8-1/2 turns; coded RED	1.401	24.84389802	18-2/3 turns: coded RLK
L403 24-84389B06 8-2/3 turns; coded GRN L404 24-84389B05 8-1/2 turns; coded RED			18-1/2 turns; coded YEL
L404 24-84389B05 8-1/2 turns; coded RED	L403	24-84389B06	8-2/3 turns; coded GRN
L405 24-84972A33 6-1/2 turns; coded RED	L404		8-1/2 turns; coded RED
	L405	24-84972A33	6-1/2 turns; coded RED

SYMBOL	MOTOROLA PART NO.	DESCRIPTION
L406	24-84972A09	6-1/2 turns; coded YEL
L407, 408	24-84972A11	3-1/2 turns; coded GRN
L409		NOT USED
L410	24-80900A61	0.62 mH
411	24-82835G08	2.6 uH; coded RED-BLU-GLD
.412		NOT USED
L413H	24-84923C01	1-1/2 turns
L413L	24-84923C04	2-1/2 turns
		connector, plug:
P401		part of printed circuit board
P402	28-84282D01	phono
P403, 902		part of printed circuit board
		transistor: (see note)
2401	48-869642	NPN; type M9642
2402, 403		NOT USED
2404	48-869571	PNP; type M9571
2405	48-869534	NPN; type M9534
2406	48-869390	NPN; type M9390
2407, 408	48-869867	NPN; type M9867
		resistor, fixed: ±5%; 1/4 W
		unless otherwise stated
401	6-124A43	560
R402	6-124A53	1.5k
R403	6-124A79	18k
1404	6-124A87 or	39k
	6-124A89	47k (factory selected for DPL models only
3405	6-124A85 or	33k
	6-124A89	47k (factory selected for PL models only)
R406	6-124A99	120k
3407	6-124804	180k
140 <i>7</i> 1408	6-124A73	10k
3409	6-124A83	27k
R410	18-83083G24	variable: 25k ± 30%
9411 thru 418	10-00000024	NOT USED
1411 (N/U 418 R419	6-124A79	18k%
3423	6-124A79	2.2k
1423 R424	6-124A57 6-124A85	2.2k 33k
R425	6-124A51	1.2k
R426	6-124A47	820
3427	0.404407	NOTUSED
R428	6-124A87	39k
R429	6-124A57	2.2k
430	6-124A35	270
1431	6-124A89	47k
1432	6-124A63	3.9k
R433		NOT USED
R434	6-124A51 .	1.2k
R435	6-124A15	39
R436	6-125C05	15 ± 10%; 1/2 W
1437	6-124A97	100k
438	6-124A49	1k
1439L	6-124A49	1k
R439H	6-124A47	820
		symmetrical clipper and splatter filter:
1401	1-80726D74	potted unit
	пол-	referenced items
	14-861196	INSULATOR, transistor; 2 req'd. (used w
	00.000701107	Q407 & Q408)
	26-83379H01	HEAT SINK (used with Q408)
	26-84598A01	SHIELD, coil; 2 req'd. (used with L405, L4
	26-84598A02	SHIELD, coil; 4 req'd. (used with L401 t L404)
	26-84250B14	SHIELD, coil; 2 re'd. (used with L407, L40)
	42-84284B01	RETAINER: 4 req'd.
	3-139506	HEX LOCK; 4-40 x 5/8"; 4 req'd. (used
	F6.04000004	mounting Retainers)
	55-84300B01	HANDLE
	30-83794C01	CABLE, coaxial; 6" req'd. (used with P402
	29-84028H01	TERMINAL, pin; 19 req'd.
	29-84028H02	TERMINAL, pin; 12 reg'd.
	29-855943	TERMINAL, pin; 16 req'd.
	39-10184A10	CONTACT, terminal; 10 req'd. diodes, transistors, and integrated cir



parts list

TLD5321B Exciter (132-150.8 MHz) = L
TLD5322B Exciter (150.8-174 MHz) = H
PL-7116-A
REFERENCE MOTORILA
SYMBOL PART NO.
DESCRIPTION
This parts list covers two models of the high band Exciter Board. Where differences exist a letter suffix L or H is added to the reference symbol to show the applicable

		capacitor, fixed: pF ±5%; 500 V
0404	04.004405	unless otherwise stated
C401 C402	21-831125	100 ± 10%; 300 V .01 uF + 80-20%; 200 V
C402	21-83596E21	NOT USED 20%; 200 V
C404	8-82905G11	.22 uF ± 10%; 50 V
C405	21-83596E13	
C406	21-83596E21	.001 uF ± 10%; 100 v .01 uF + 80-20%; 200 v 3.9 uF ± 20%; 15 V 100 ± 10%; 300 V 0.1 uF + 80-20%; 25 V
C407, 408	23-84762H08	3.9 uF ± 20%; 15 V
C409, 410	21-831125	100 ± 10%; 300 V
C411	21-82372C03 21-83596E10	0.1 uF + 80-20%; 25 V
C412, 413, 415	21-83596E10	
C414, 416, 417 C418 thru 421	21-831125 23-84762H08	100 ± 10%; 300 V 3.9 uF ± 20%; 15 V .05 uF + 80-20%; 25 V
C422	21-82372C10	3.9 UF ± 20%; 15 V
C423	21-83596E10	220 + 10%
C424, 425, 426	21-83596E10 21-82872C10	220 ± 10% .05 uF + 80-20%; 25 V
C427	21-83406D51 21-83406D68 21-83596E21	3 ± 0.25 pF
C428	21-83406D68	27; 500 V .01 uF + 80-20%; 200 V
C429	21-83596E21	.01 uF + 80-20%; 200 V
C430L		150
C430H	21-84494B06	120
C431	21-83406D54 21-84494B16	4 ± 0.25 pF
C432L	21-84494B16	330
C432H	21-84494B13	240
C433L	21-84494B13 21-84494B46	240 240 180 + 3%
C433H C434, 435	2:-04434040	180 ± 3% NOT USED
C436	21-83596E21	.01 uF + 80-20%: 200 V
C437	21-83596E13	.001 uF ± 10%; 100 V
C438L	21-84494B01	51
C438H	21-84494B24	39
C439	21-861453	1.5 ± 10%
C440L	21-852322	62
C440H	21-868681	47
C441L	21-84494B10	190
C441H	21-861601 21-83596E21 21-84493B26	130
C442, 443	21-83596E21	.01 uF + 80-20%; 200 V 22
C444L C444H	21-84493B2b	10
C445	21-83406D55 21-82187B45 21-82450B37 21-83596E13	18 470 ± 10%
C446	21-82450B37	0.47
C447	21-83596E13	.001 uF ± 10%; 100 V
C448L	21-83406D92	.001 uF ± 10%; 100 V 36
C448H	21-83406D56 21-84493B31	24
C449L ·	21-84493B31	24 57; 200 V
C449H	21-84494B28 21-83596E13	43
C450	21-83596E13	.001 uF ± 10%; 100 V
C451	21-83596E13	.01 uF + 80-20%; 200 V
C452L	21-83406D93	16 11
C452H C453L	21-83406D90	20
C453H	21-83406D81 21-83406D55	18
C454	21-82450B06	0.75 + 10%
C455	21-0245000	0.75 ± 10% NOT USED
C456L	21-83406D90	11
C456H	21-83406D70	0 + 0 6 n E
2457	21-83406D89	10 ± 0.5 pF
2458	21-82372C10	.05 ± 20%; 25 V
2459	21-840365	10 ± 0.5 pF .05 ± 20%; 25 V 24; NPO
C460	21-83596E10	220 ± 20%
C461L	21-84494807	150
C461H	21-84494806	120 .001 uF ± 10%; 100 V
2462, 463 2464	21-84494B06 21-83596E13 21-82355B62	.001 uF ± 10%; 100 V
C464 C465	Z1-02300B0Z	NOT USED
2465 2466	21-82187B06	560
.400 2467	21-82372C10	.05 ± 20%; 25 V
2401	2102012010	.00 1 20 70, 20 1
		diode: (see note)
CR401	48-863030	germanium
CR402, 403		NOTUSED
CR404, 405	48-82139G01	germanium
		coll, rf:
401	24-84392806	40 turns on 820 ohm resistor
402L	24-84392B13	15 turns on 560 ohm resistor
402H	24-84392B05	9 turns on 560 ohm resistor
403L	24-84392G18 24-82835G08	40 turns on 10k ohm resistor 2.7 uH coded RED-BLU-GLD
403H	24-628330008	2.7 SH COOSG NED-BLO-GLD
		connector, receptacle:
401		NOT USED
402	9-84207B01	7 contacts
		coll, rf:
.401	24-84389B02	18-2/3 turns; coded BLK
402	24-84389B01	18-1/2 turns; coded YEL
403	24-84389B06	8-2/3 turns; coded GRN
		D. 670 Average and ad DED
404 405	24-84389B05 24-84972A33	8-1/2 turns; coded RED 6-1/2 turns; coded RED

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
L406	24-84972A09	6-1/2 turns; coded YEL
L407, 408 L409	24-84972A11	3-1/2 turns; coded GRN
L409 L410	24-80900A61	NOT USED 0.62 mH
L411		
L412 '	24-82835G08	2.6 uH; coded RED-BLU-GLD NOT USED
L413H	24-84923C01	1-1/2 turns
413L	24-84923C04	2-1/2 turns
	24 04320004	
P401		connector, plug: part of printed circuit board
P402	28-84282D01	phono
P403, 902		part of printed circuit board
		transistor: (see note)
2401	48-869642	NPN; type M9642
Q402, 403 Q404	48-869571	NOTUSED
Q405	48-869534	PNP; type M9571
2406	48-869390	NPN; type M9534
Q407, 408	48-869867	NPN; type M9390 NPN; type M9867
2407, 400	40-003007	NPN; type M9867
		resistor, fixed: ±5%; 1/4 W
		unless otherwise stated
R401	6-124A43	560
R402	6-124A53	1.5k
R403	6-124A79	18k
R404	6-124A87 or	39k
	6-124A89	47k (factory selected for DPL models only
R405	6-124A85 or	33k
	6-124A89	47k (factory selected for PL models only)
R406	6-124A99	120k
R407	6-124B04	180k
R408	6-124A73	10k
7409	6-124A83	27k
9410	18-83083G24	variable: 25k ± 30%
R411 thru 418		NOT USED
R419	6-124A79	18k%
R423	6-124A57	2.2k
R424	6-124A85	33k
R425	6-124A51	1.2k
R426	6-124A47	820
3427		NOT USED
R428	6-124A87	39k
R429	6-124A57	2.2k
R430	6-124A35	270
R431	6-124A89	47k
R432	6-124A63	3.9k
7433		NOT USED
7434	6-124A51	1.2k
R435	6-124A15	39
9436	6-125C05	15 ± 10%; 1/2 W
3437	6-124A97	100k
R438	6-124A49	1k
R439L	6-124A49	1k
R439H	6-124A47	820
J401	1-80726D74	symmetrical clipper and splatter filter: potted unit
J-101		referenced items
	14-861196	INSULATOR, transistor; 2 req'd. (used wi
	00 000701104	Q407 & Q408)
	26-83379H01 26-84598A01	HEAT SINK (used with Q408)
		SHIELD, coil; 2 req'd. (used with L405, L40
	26-84598A02	SHIELD, coil; 4 req'd. (used with L401 th L404)
	26-84250B14	SHIELD, coil; 2 re'd. (used with L407, L408
	42-84284801	RETAINER: 4 reg'd.
	3-139506	HEX LOCK; 4-40 x 5/8"; 4 req'd. (used formounting Retainers)
	55-84300B01	HANDLE
	30-83794C01	CABLE, coaxial; 6" req"d. (used with P402)
	29-84028H01	TERMINAL, pin; 19 reg'd.
	29-84028H02	TERMINAL, pin; 12 req'd.
	29-84028H02 29-855943 39-10184A10	TERMINAL, pin; 12 req'd. TERMINAL, pin; 16 req'd. CONTACT, terminal; 10 req'd.



EXCITER/1ST BANDPASS FILTER

MODEL TLE1720B SERIES

TRIPLER/LOW LEVEL AMPLIFIER

MODEL TLE1600B SERIES

REFERENCE

MOTORO PART N

PARTS LIST

TLD5491A, AV Exciter (13 TLD5492A, AV Exciter (15

This parts list covers tw Board. Where differenc added to the reference sy

C401 C402 C403 C404 C405 C406 C407, 408 C409, 410 C411 C412, 413 C414 C415 C416, 717 C418 thru 421 C422 C423 C424, 425, 426 C427 C428 C429 C430L C430H C431 C432L C432H C432L C433H C434, 435 C436 C437 C448H C441L C441H C442, 443 C444L C444H C445L C444H C445L C444H C445L C444H C445L C444H C445L C444H C445L C445H C445C C456L C456L C457 C458 C457 C458 C459 C460 C461L C461H C461 C461 C461H C462, 463 C465 C465 C4661 C467 C4661 C461 C461 C461 C461 C461 C461 C46	21-83406 21-82133 21-82428 21-84494 21-83406 21-84494 21-84494 21-84494 21-84494 21-84494 21-84494 21-86145 21-85232 21-86465 21-84494 21-86160 21-82428 21-83406 21-82428 21-83406 21-83596 21-84494 21-83596
C 465 C 466	21-824281

Motorola No. PEPS-18716-H (Sheet 1 of 2) 10/5/82 · V & G

EXCITER/1ST BANDPASS FILTER

MODEL TLE1720B SERIES

TRIPLER/LOW LEVEL AMPLIFIER

MODEL TLE1600B SERIES

NOT 413 P401 NOTE FRO 10 11 4

NOTES

- 414 THE TRIPLER/LOW LEVEL AMPLIFIER "BOX" IS NOT REPAIRABLE. IF DEFECTIVE, IT MUST BE REPLACED THIS ALSO APPLIES TO THE 1ST AND 2ND BANDPASS FILTERS
- 415. APPLIED TO THE FOLLOWING PA STAGE (OR DRIVER AMPLIFIER OF THE BB4RCB MODEL SERIES).

CEPS-17178-C

FUNCTION

Exciter — Produces modulated RF signal in 135-171 MHz range.

1st Bandpass Filter — Attenuates signals outside the bandpass range.

Tripler/Low Level Amp. — Triples exciter output frequency and amplifies that signal to drive the following PA.

2nd Bandpass Filter
Note 410

A TFE6153A TFE6154A TFE6155A

X

X

Motorola No. PEPS-18716-H (Sheet 2 of 2) 10/5/82 - V & G

EXCITER/1ST BANDPASS FILTER

MODEL TLE1720B SERIES

TRIPLER/LOW LEVEL AMPLIFIER

MODEL TLE1600B SERIES

Motorola No. PEPS-18716-H

(Sheet I of 2) 10/5/82 - V & G REFERENCE MOTOROLA SYMBOL PART NO. DESCRIPTION

PARTS LIST

L=GEND

L = 132-150.8 MHz
H = 150.8-174 MHz

TLD5491A, AV Exciter (132-150, 8 MHz) TLD5492A, AV Exciter (150, 8-174 MHz)

DJY7ER, AV BACKET (15010-114 INITS)			
This parts list covers two models of the high band Exciter			
Board. Where differences exist a letter suffix L or H is			
added to the re	ference symbol	to show the applicable unit.	
		CAPACITOR, fixed: pF ±5%;	
		500 V: unless otherwise stated 100 ±10%; 300 V	
401	21-831125	100 ±10%: 300 V	
2402		.01 uF +80-20%; 200 V	
2403 2404		NOT USED	
404	8-82905G11	. 22 uF ±10%: 50 V	
405	21-83596E13	NOT USED . 22 m ± 10%; 50 V .001 uF ±10%; 100 V .01 uF +80-20%; 200 V 3.9 uF ±20%; 15 V 100 ±10%; 300 V 0.1 uF +80-20%; 25 V 220 ±20%	
406	21_82428B62	01 nF +80-20% - 200 V	
407, 408	23-84762 HOS	3 9 nF +20% - 15 V	
409, 410	21_831125	100 +10% - 300 V	
411	21-82372C03	0 1 vF +80-20% 25 V	
412. 413	21-83506 F10	220 +20%	
414	21-831125	100 ±10% 300 V	
415	21-83596E10	100 ±10%; 300 V 220 ±20%	
416, 717	21-03370210	NOT USED	
410 45 421	22 047671100	2 0 "E +30%, 16 M	
410 turu 451	21 02272004	3.9 uF ±20%; 15 V .05 uF +80-20%; 25 V	
422	21 02504510	220 430#	
423	21 -03370E10	220 F2076	
424, 425, 426	21-02372004	. 05 UF +80-2070; 25 V	
427	21-83400D31	3 ±0.25 pr	
428	21-82133006	220 ±20% .05 uF +80-20%; 25 V 3 ±0.25 pF 27; 500 V	
	Z1-8Z4Z8B6Z	.01 uF +80-20%; 200 V 150 120 4 ±0.25 pF	
430L	21-84494807	150	
430H	21-84494B06	120	
431	21-83406D54	4 ±0,25 pF	
432L			
432H	21-84494B13	240	
433L	21-84494B13	240	
433H	21-84494B13 21-84494B13 21-84494B46 21-82428B62	180 ±3%	
434, 435		NOT USED .01 uF +80-20%; 200 V .001 uF ±10%; 100 V 51 39	
436	21-82428B62	.01 uF +80-20%; 200 V	
437	21-83596E13	.001 uF ±10%; 100 V	
438L	21-84494B01	51	
438H	21-84494B24	51 39 1.5 ±10% 1 ±10% 12 47 130 ±3% .01 uF +80-20%; 200 V 51; 200 V	
439L	21-861453	1.5 ±10%	
439H	21-864518	1 ±10°°0	
440L	21-852322	62	
440H	21-868681	47	
441L	21-84494B10	190	
441H	21-861601	130 ±3%	
442, 443	21-82428B59	.01 uF +80-20%; 200 V	
444L	21-84493B27	51; 200 V	
444H	21-84484B24	39	
445L	21-84484B24 21-83406D91	40	
445H	21-84494B30	34 0.75 ±10% .001 uF ±10%; 100 V	
440	21-82450B06	0.75 ±10%	
447	21-83596F13	001 vE +10%: 100 V	
448L	21-83406092	36	
448H	21-83406D56	.001 uF ±10%; 100 V 36 24 57; 200 V 43 .001 uF ±10%; 100 V .01 uF +80-20%; 200 V 16 10 10 10 10 10 10 10 10 10 10	
449L	21-84493B31	57: 200 V	
449H	21-84494828	43	
450	21-83596E13	.001 uF ±10%: 100 V	
451	21-82428862	.01 uF +80-20%: 200 V	
452L	21-83406093	16	
452H	21 93406000	11	
	21 -03400070	20	
453L 453H	21 -03400001	10	
	21 -03400000	0 75 .100	
454	21-82450500	0.75 ±10%	
455	21-83596E13	.001 uF ±10%; 100 V	
456L	21-83406090	11	
456H	21-83406D70	8 ±0.5 pF	
457	21-83406089	10 ±0,5 pF	
458	Z1-83596E13	.001 uF ±10%; 100 V	
459	21-840365	24; NP0	
460	21-83596E10	220 ±20%	
461L	21-84494307	0 ±0.5 pF .001 uF ±10%; 100 V 24; NPO 220 ±20%	
461H	Z1-84494B06	120	
402, 403	21-83596E13	.001 uF ±10%; 100 V	
464	Z1-82355B62	1.0	
41.5	Z1-82428B59	.01 uF +80-20%; 200 V	
466	Z1-82610C23	.001 uF ±10%; 100 V 1.0 .01 uF +80-20%; 200 V 6.8 ±.5%; 200 V	

			DESCRIPTION		REFERE SYMB
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21-82187B07 470 ±10%

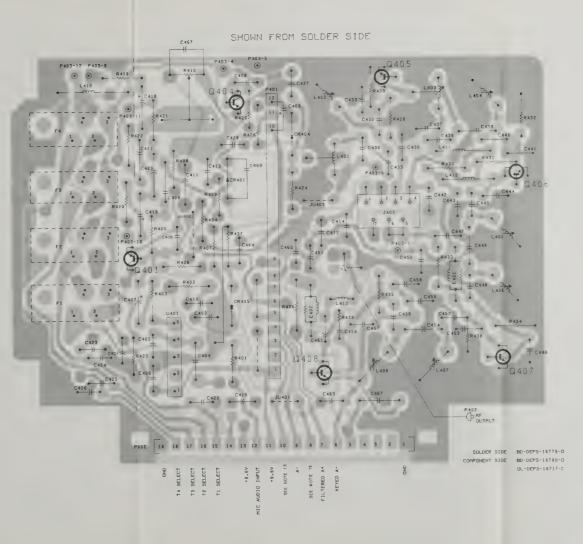
21-8245 21-8245	tor
CR401	tor
28401 48-863030 germanium NOT USED NO	tor
28401 48-863030 germanium NOT USED NO	tor
ER402, 403 CR404, 405 48-82139001 Sermanium COIL, rf: 40 turns on 820 ohm resist E402H 24-84392805 E402H 24-84392805 9-84207801 9-84207801 7 contacts	tor
CR404, 405 48-82139G01 germanium E401 24-84392B06 40 turns on 820 ohm resis e402H 24-84392B13 15 turns on 560 ohm resis e702H 24-84392B05 9 turns on 560 ohm resis consistent of turns of	tor
E401 24-84392806 COIL, rf: 40 turns on 820 ohm resis E402L 24-84392813 15 turns on 560 ohm resis E402H 24-84392805 9 turns on 560 ohm resis CONNECTOR, receptacle NOT USED 7 contacts	tor
E401 24-84392B06 40 turns on 820 ohm resis E402H 24-84392B13 15 turns on 560 ohm resis E402H 24-84392B05 9 turns on 500 ohm resist CONNECTOR, receptacle NOT USED 7 9-84207B01 7 contacts	tor
E401 24-84392B06 40 turns on 820 ohm resis E402H 24-84392B13 15 turns on 560 ohm resis E402H 24-84392B05 9 turns on 500 ohm resist CONNECTOR, receptacle NOT USED 7 9-84207B01 7 contacts	tor
E401 24-84392B06 40 turns on 820 ohm resis E402H 24-84392B13 15 turns on 560 ohm resis E402H 24-84392B05 9 turns on 500 ohm resist CONNECTOR, receptacle NOT USED 7 9-84207B01 7 contacts	tor
J401 CONNECTOR, receptacle NOT USED 7 contacts	
J401 CONNECTOR, receptacle NOT USED 7 contacts	
J401 CONNECTOR, receptacle NOT USED 7 contacts	OT.
J401 J402 9-84207B01 7 contacts	
7402 9-84207B01 7 contacts	-
	- 1
CON -6	
1 5011 -6	
	- 1
L401 24-84389B02 T8-2/3 turns; coded Black	.
24-04307B02 10-2/3 turns, coded Black	,]
L402 24-84389B01 18-1/2 turns; coded Yello	w
L403 24-84389B06 8-2/3 turns; coded Green	
L404 24-84389B05 8-1/2 turns; coded Red	
L405, 406 24-84972A09 6-1/2 turns; coded Yellow	-
L407, 408 24-84972A11 3-1/2 turns; coded Green	
L401 24-84389B0 COLL_rI: 18-2/3 turns; coded Black 1402 24-84389B0 l 18-1/2 turns; coded Yello L403 42-84389B0 l 8-2/3 turns; coded Yello L404, 405, 406 24-84389B05 8-2/3 turns; coded Red L405, 406 24-84972A09 6-1/2 turns; coded Yellow 1407, 408 24-84972A11 3-1/2 turns; coded Green North	
L409 NOT USED	
L410 24-80900A61 0.62 mH L411, 412 24-82835G08 2.6 uH; coded Red-Blue-0	
L411, 412 24-82835G08 2.6 uH; coded Red-Blue-0	iold
L413 24-84923C01 1-1/2 turns	
CONNECTOR, plug:	1
DANA OF PRINTED TORY, PLUS:	200
P401 part of printed circuit box	110
P402 28-84282D01 phono	
P403, 902 part of printed circuit box	rd
TRANSISTOR - (SEE NOT)	
O401 48-869642 NPN; type M9642	
NOT HEED	
Q402, 403 NOT USED	
C404 48-869571 PNP; type M9571 C405 48-869534 NPN; type M9534 C406 48-869390 NPN; type M9390 C407,408 48-869867 NPN; type M9867	
Q405 48-869534 NPN; type M9534	
C406 48-869390 NPN; type M9390	
C407, 408 48-869867 NPN; type M9867	
C407, 408 48-869867 NPN; type M9867	/ 4 307
RESISTOR, fixed: ± 57%;	7 ± W
	1
R401 6-124A43 560 ohms R402 6-124A53 1.5k	
R402 6-124A53 1.5k	
R402 6-124A73 1.5% R403 6-124A79 18k R404 6-124A87 39k	
N-103 0-1247/7 10A	
R404 6-124A87 39k or6-124A89 47k R405 6-124A85 33k	
or6-124A89 47k	
R405 6-124A85 33k	
or6-124A89 47k	
R406 6-124A99 120k	
0-124A77 120K	
R407 6-124B04 180k	
R407 6-124804 160k R408 6-124A73 10k	
P408 6-124A73 10k	
R407 6-124B104 100k R408 6-124A73 10k R409 6-124A81 22k R410 18-83083G24 variable: 25k ±30%	
R407	
R409 6-124801 22k R410 18-83083G24 variable: 25k ±30% R411 thru 418 NOT USED	
R409 6-124801 22k R410 18-83083G24 variable: 25k ±30% R411 thru 418 NOT USED	
R409 6-124A01 22K 430% R410 R411 thru 418 R419 thru 422 6-124A79 R423 6-124A57 2.2k	
R409 6-124A91	
R409 6-124A91 R410 thru 418 R424 R424 R425 R424 R426 R427 R426 R427 R429 R427 R429 R428 R430 R431 R43	
R409 6-124A91	
R409 6-12-4-841 R410 thru 418 R411 thru 418 R411 thru 418 R412 thru 422 6-12-4-875 R422 6-12-4-875 R427 R427 R427 R427 R427 R427 R427 R427	
R409 6-124A91 R410 thru 418 R410 thru 418 R410 thru 418 R410 thru 422 6-124A79 18k R424 R424A77 R426 R427 R427 R427 R429 6-124A91 R429 6-124A91 R429 6-124A91 R429 R430 R431 6-124A91 R431 R434 R43	
R409 6-124A91 R410 thru 418 R410 thru 418 R410 thru 418 R410 thru 422 6-124A79 18k R424 R424A77 R426 R427 R427 R427 R429 6-124A91 R429 6-124A91 R429 6-124A91 R429 R430 R431 6-124A91 R431 R434 R43	AND
R409 6-124A91 R410 thru 418 R410 thru 418 R410 thru 418 R410 thru 422 6-124A79 18k R424 R424A77 R426 R427 R427 R427 R429 6-124A91 R429 6-124A91 R429 6-124A91 R429 R430 R431 6-124A91 R431 R434 R43	RAND
R409 6-124A91 R410 thru 418 R410 thru 418 R410 thru 418 R410 thru 422 6-124A79 18k R424 R424A77 R426 R427 R427 R427 R429 6-124A91 R429 6-124A91 R429 6-124A91 R429 R430 R431 6-124A91 R431 R434 R43	RAND
R409 6-124A91 R410 thru 418 R410 thru 418 R410 thru 418 R410 thru 418 R410 thru 422 6-124A79 6-124A57 R424 R	₹ AND

REFERENCE MOTOROLA DESCRIPTION PART NO.				DESCRIPTION	
---	--	--	--	-------------	--

14-861196	INSULATOR, transistor;
14-801170	2 req'd. (used with Q407 &
26-83379H01	HEAT SINK (used with Q408)
26-84598A01	SHIELD, coil; 4 req'd. (used
	with L405 thru L408)
26-84598A02	SHIELD, coil; 4 req'd, (used
	with L401 thru L404)
42-84284B01	RETAINER; 4 req'd.
3-139506	SCREW, tapping; Phillips
	round hd., 4-40 x 5/16"
	4 req'd. (used for mounting
	Retainers)
55-84300B01	HANDLE
30-83794C01	CABLE, coaxial; 6" req'd. (used with P402)
29-84028H01	TERMINAL, pin; 19 req'd.
29-84028H02	TERMINAL, pin; 12 req'd.
29-855943	TERMINAL, pin; 16 req'd.
39-10184A10	CONTACT, terminal; 10 req'd.

NOTE: For optimum performance, replacement diodes and transistors must be ordered by Motorola part numbers.

	SIONS	PEPS-18716-D	
CHASSIS AND	REF. SYMBOL	CHANGE	LOCATION
TLD5491A TLD5492A	R428	FROM 6-124C85; 33k TO 6-124C87, 39k	PARTS LIST
	8437	FROM 6-124C97, 100k TO 6-124C94; 82k	
	C466	FROM 21-82428B28, .002 uF: ±10%; 500 V TO 21-82610C23.	
		6.8 pF: *.5%, 200 V	PARTS LIST
	R404. R405	6-124A89 47k ±5%;	PARIS DIST
	R#09	From 6-124C88, 27k	Meter 1 1402-1



411. R402 and R403 removed when flat audio board is used. 412. JU402 added when flat audio board is used

413. When PL squeich is used, signal name of P401-10 is Code Input; P401-4 and P902-8 is Delayed Keyed A + P401-2 and P902-10 is Keyed A + When flat audio board option is used, signal name of P401-10 is IDC Limited Audio, P401-4 and P902-8 is Flat Audio; P401-2 and P902-10 is Flat Audio Control.

EXCITER/1ST BANDPASS FILTER

MODEL TLE1720B SERIES

TRIPLER/LOW LEVEL AMPLIFIER MODEL TLE1600B SERIES

FUNCTION

Exciter - Produces modulated RF signal in

1st Bandpass Filter - Attenuates signals outside the bandpass range.

Tripler/Low Level Amp. - Triples exciter output frequency and amplifies that signal to drive the following

Model Complement Consists of Exciter Board Exciter 1st Bandpass FD6371A TFD6373A TFD6374A TFD6375A TLDG991A TLDG992A

Assembly					Cons	lsts of				
		sls and are Kit			Level Amplifie e 410	r			pass Filter e 410	
Tripler/Low Level Amplifier	T1.\\$650B	1R\87284	TLE8391A	TLE8393B	TLE8394B	TLE8395B	TFE6151 A	TFE6153A	TFE6154A	TFE61554
TLE1601B (406-420 MHZ)		X	×				X			
TLE1603B (450-470 MHZ)	×			X				×		
TLE1604B (470-494 MHZ)	X				X				X	
TLE1605B (494-512 MHZ)	X					Υ.	_			

Motorola No. PEPS-18716-H 10/5/82 - V & G





MOTOROLA INC.

Communications Sector

PAGING SYNTHESIZER

MODELS: TLB1562A 30-36 MHz TLB1563A 36-42 MHz TLB1564A 42-50 MHz TLD2593A 150-174 MHz TLE2273A 450-512 MHz

PERFORMANCE SPECIFICATIONS

Frequency Stability With HSO (High Stability Osc) Without HSO	Same as HSO (\pm .02 ppm) \pm 2 ppm $-$ 30 to $-$ 60 °C
Supply Voltage Requirements	+13.8 V dc ±20%
Supply Current Drain	500 mA, maximum
Spurious and Harmonic Emissions	More than 85 dB below carrier
FM Noise With EIA Pre-emphasis With Flat Audio	55 dB 40 dB
Audio Response	± 0.5 dB; 300 Hz to 3 kHz
Audio Harmonic Distortion	Less than 1% at ±3 kHz
Audio Sensitivity Low Band Other Bands	3 V to 4 V p-p for \pm 5 kHz at 1 kHz 2 V to 3 V p-p for \pm 5 kHz at 1 kHz
DC Deviation Range at Fe	±3 kHz to ±5 kHz
Data Deviation Range at Fc -	±3 kHz to ±5 kHz
Data/Voice Mode Transient	Less than 100 Hz peak
Data Rise Fall Time	Less than 400 usec
RF Output	0.3 V rms to 1 V rms
Frequency Ranges: Low Band 30-50 MHz High Band 150-174 MHz VHF 450-512 MHz 900 MHz 928-960 MHz	10.0 to 16.666 MHz 12.5 to 14.5 MHz 12.5 to 14.222 MHz 12.888 to 13.333 MHz

PAGING SYNTHESIZER INTERFACE REQUIREMENTS

HSO Supply Voltage	24 V dc ± 10%
HSO Power Consumption	11 watts, max.
Synthesizer Supply Voltage	13.8 V dc ±20%
Synthesizer Current Drain	500 mA dc
HSO RF Level	More than 1.0 V rms @ 50 ohms
Synthesizer RF Output Level	More than 0.3 V rms into cable terminated by exciter
Audio Input Level Data Levels Data Enable Levels	More than 4 V peak to peak @ 1 kHz "1" — More than 4 V "0" — Less than 0.7.V Enable — More than 7 V Disable — Less than 0.7 V
RF Enable Input	Enable — Less than 0.7 V (I Source = 4 mA Disable — More than 9 V
Out of Lock Indicate	Isink less than 4 mA dc
Synthesizer Metering	TEK-5 or equivalent

PAGING SYNTHESIZER MODEL CHART FREG. RANGE 450-512 MHz 150.8-174 MHz 42-50 MHz 36-42 MHz 30-36 MHz CODE: TLE2273A TLD2593A TLB1564A TLB1563A TLB1562A = ONE ITEM SUPPLIED ITEM DESCRIPTION TRN5058A REGULATOR BOARD TRN5446A SYNTHESIZER CABLE TRN5447A SYNTHESIZER HARDWARE TLB8502A SYNTHESIZER BOARD 30-36 MHz TLB8503A SYNTHESIZER BOARD 36-42 MHz SYNTHESIZER BOARD 42-50 MHz TLD9333A SYNTHESIZER BOARD 150.8-174 MHz TLE5493A SYNTHESIZER BOARD 450-512 MHz

EPS-34980-O

1. GENERAL DESCRIPTION

The paging synthesizer is a standard 19" rack mounted unit designed for use in Motorola Micor Paging Base Stations. The paging synthesizer provides a modulated rf signal to drive the exciter. Modulation can be either analog (voice and tones) or digital (binary paging codes or equivalent). Digital modulation including dc is made possible by the technique of dual-port modulation, where dc and low frequency data components are controlled by the digital modulation circuit. The higher frequency components of modulation (greater than 1 Hz) are accommodated by direct frequency modulation (fm) of the synthesizer voltage controlled crystal oscillator (VCXO or channel element). The paging synthesizer also provides high frequency stability by optional phase-locking to 100 kHz, 1 MHz, 5 MHz (standard) or 10 MHz high stability reference oscillators. Refer to the voltage regulator board and paging synthesizer schematic and block diagrams for the following descriptions. Figures 1 and 2 show component location and the solder side shield location.

2. FUNCTIONAL BLOCK DESCRIPTIONS

- 2.1 9.6 V AND 5 V REGULATORS (Refer to PEPS-34965 for details)
- 2.1.1 The 9.6 V regulator consists of a series pass transistor (Q400) which is driven by the regulator integrated circuit (U400). The regulated 9.6 V dc is provided to all analog and rf circuits, and is derived from the station 12 V dc supply (typically 13.6 V dc).
- 2.1.2 The 5 V regulator is derived from the regulated 9.6 V dc supply, and provides regulated 5 V dc to all logic circuits requiring 5 V dc. The 5 V regulator consists of a 3-terminal integrated circuit (U401).
- 2.2 REFERENCE AMPLIFIER AND SWITCH (Q24, Q23)
 (Refer to Paging Synthesizer diagrams PEPS-34989 for details)

The reference amplifier and switch amplify the high stability oscillator signal to the proper logic levels and shape, for application to integrated circuits U14 and U16.

2.3 REFERENCE DIVIDER (U14, U15, U16)

The reference divider divides the High Stability Oscillator (HSO) frequency down to 100 kHz for use in phase locking U18, the 14.4 MHz oscillator. HSO frequencies of 100 kHz, 1 MHz, 5 MHz, or 10 MHz can be programmed by jumpers JU20 and JU21.

2.4 REFERENCE PHASE DETECTOR (U17)

One section of U17, (quad exclusive-OR gate) is used as a reference phase detector. The output consists

of pulses at 200 kHz, (twice the input frequency) having a width dependent on the phase error between the two input signals to U17.

2.5 REFERENCE LOOP FILTER (Q22 with associated circuitry)

Q22 amplifies the output pulses of U17 to approximately 8 volts peak-to-peak. R61, C62, R60, and C61 form an integrator circuit which recovers the dc value of Q22 output pulses, for use in controlling the frequency of U18 (14.4 MHz voltage controlled crystal oscillator, VCXO).

2.6 14.4 MHz VOLTAGE CONTROLLED CRYSTAL OSCILLATOR (U18)

U18 is a 14.4 MHz voltage controlled crystal oscillator which is phase-locked to the HSO. The output of U18 is used to provide one of the phase detector (U17) inputs, and also provide an input to the digital modulator circuitry (U11).

2.7 REFERENCE LOOP AMPLIFIER (Q21, Q20, Q19)

The reference loop amplifier amplifies U18 output signal to the proper logic levels and shape for application to U19 (reference loop divider) and U11 (digital modulator).

2.8 REFERENCE LOOP DIVIDER (U19, U20)

Reference loop dividers U19 and U20 divide the output frequency of Q19 by 144. This is the 100 kHz feedback signal to the phase detector (U17), which is compared in phase to the 100 kHz signal derived from the HSO.

- 2.9 DIGITAL MODULATOR (U9, U10, U11, U12, U13)
- 2.9.1 This circuit frequency modulates the output signal of Q19 to the "one" and "zero" frequencies upon command of the pulse insertion oscillator, integrated circuit dividers U5 through U8.
- 2.9.2 Pulse insertion results in positive deviation by inserting extra pulses into the 14.4 MHz pulse train at the appropriate rate. This takes place in integrated circuit U12 (exclusive-OR gate with the input on pins 4 and 5; output on pin 6).
- 2.9.3 Pulse blanking, similarly, creates negative deviation by blanking pulses from the 14.4 MHz pulse train at the appropriate rate. This occurs in integrated circuit U11 (input pins 12 and 13, output pin 11).
- 2.9.4 Pulse insertion is selected upon command by a data enable and a data "one". Pulse blanking is

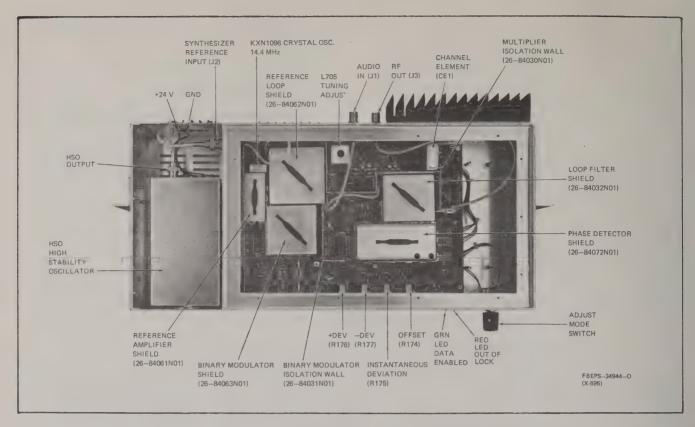
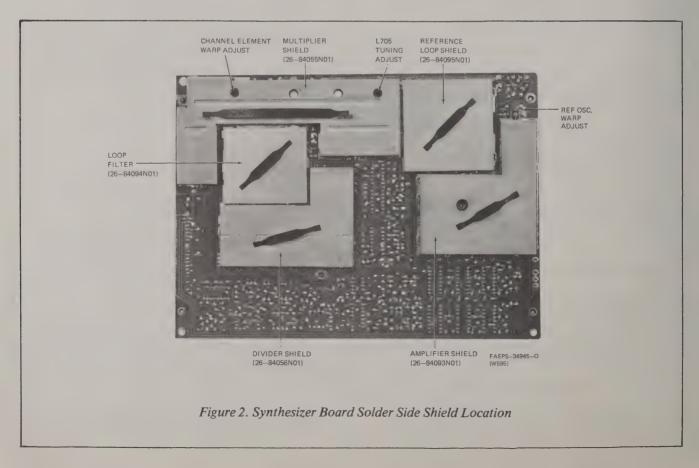


Figure 1. Paging Synthesizer Component Location



selected upon command by a data enable and a data "zero". The appropriate rate of insertion pulses or blanking pulses is determined by the following formula:

$R = \frac{Deviation \times 14.4 \text{ MHz}}{Carrier \text{ Frequency (MHz)}}$

The frequency modulated 14.4 MHz is divided by two to 7.2 MHz, by U13 (input pin 11, output pin 9) and serves as the reference input for the main synthesizer loop phase detector U602.

2.10 PULSE INSERTION OSCILLATORS AND DIVIDERS (U1 and U3-U8)

U1 is a dual timer which serves as two independent RC oscillators. The outputs are frequency divided by U3 through U8 to obtain the pulse insertion and blanking rates mentioned in paragraph 2.9. These are necessary for (+) and (-) data deviation of the 14.4 MHz signal. R176 and R177 are precision potentiometers for setting the "one" and "zero" (or + and -) deviations respectively. In order to obtain the proper deviations, jumpers JU1 through JU18 which set the divider ratios, must be properly installed.

2.11 MAIN LOOP DIVIDER (U602), ROM (U604)

- 2.11.1 U602 is an integrated circuit which is used to divide the 7.2 MHz reference input (pin 2) to either 2.0833 kHz or 2.500 kHz output (pin 5) depending on the frequency band (900 MHz, UHF, HB, or LB respectively). The internal ÷63/÷64 prescaler is driven by U601 and in turn drives the A and B dividers internally. The choice of 2.0833 kHz, or 2.500 kHz, and the numbers programmed into the A and B dividers are stored in U604 and called out on "D" lines (U604-12,11,10,9) by U602 addressing the "A" lines U604-5,6,7.
- 2.11.2 The A and B dividers provide the loop output at 2.0833 kHz or 2.500 kHz (U602-9). This frequency is derived from the channel element (CE1). U602 pin 9 is also used to signal the ÷3/÷4 prescaler (U601) when to divide by 4 rather than 3. The Co and Cl lines (pins 15 and 16) signal to U601 how many times to divide by 4 rather than 3. This information is stored in U604 ROM and (like A and B divider programs) differs from channel to channel.

2.12 SAMPLE AND HOLD PHASE DETECTOR (U603)

Integrated circuit U603 is used to compare the two divider IC output phases (2.0833 kHz or 2.500 kHz depending on the frequency band). It ultimately generates an output signal on pin 15, which after further filtering and amplification, is used to control the frequency of the channel element (CE1).

2.13 LOOP DC AMPLIFIERS (U609, U21) LOOP FILTERS, AND LOOP SUMMERS (U21)

- 2.13.1 U609 is a dc amplifier with a gain of approximately 11; this amplifies the output signal from U603 and applies it to the loop filter.
- 2.13.2 The loop filter is composed of R122, R123, C23, C24, and C28. It is a standard lead-lag filter and results in a loop bandwidth of about 1/2 Hz, with a damping factor of approximately 0.65. These parameters determine the cross-over between pulse insertion/blanking modulation, and the modulation summed in this loop is approximately 1 Hz.
- 2.13.3 The first loop summer (U21-8,9,10) adds binary modulation to the loop dc control voltage and amplifies the data amplitude by a factor of 2. Following the first loop summer is a 3 kHz passive RC low pass filter (R79, R78, R77, C74, C75, and C76), which has no effect on the dc control voltage, but shapes the data modulation to prevent excessive modulation sideband splatter. This filter is buffered by unity gain amplifier O25, O26.
- 2.13.4 U21 pins 2 and 3 is the second loop summer which is used to sum voice or tone modulation with the loop dc control voltage. For modulation, it has a voltage gain of unity; for the loop signals, it has a voltage gain of two. The output (pin 1) is applied directly to the channel element (CE1) modulation port (pin 4). This controls the channel element frequency so that it is phase locked to the 7.2 MHz output of the digital modulator circuit, and also directly frequency modulates it with voice or tones, or splatter filtered data.

2.14 CHANNEL ELEMENT (CE1)

The channel element serves as the voltage crystal oscillator (VCO) in the main synthesizer loop, and provides an output signal between 10 and 16-2/3 MHz. The output signal is amplified and drives the exciter in the transmitter portion of the base station.

2.15 EXCITER AMPLIFIER/BUFFER SWITCH (Q701, Q36, Q37, CR1, CR2)

Q701 amplifies the output of channel element (CE1) to the proper level to drive a base station exciter. Q36 and Q37 buffer the output of Q701 to prevent loading by the coaxial cable used to connect it to the base station exciter. CR1 and CR2 PIN diodes used in a series-shunt rf switch greatly attenuate the signal delivered to the base station exciter, if rf enable is a high level dc signal. The output of the synthesizer (Q36 and Q37 emitters) is frequency multiplied in the base station, just as a normal channel element signal would be: \times 3 for low band, \times 12 for high band, \times 36 for UHF, and \times 72 for 900 MHz.

2.16 FREQUENCY MULTIPLIERS (Q706, Q702, Q703, Q704) AND BUFFER (Q40)

- 2.16.1 For low band models, Q702 and Q703 are not used. Q706 is a unity gain amplifier, and Q704 and associated components form a frequency tripler. The output of Q704 is limited in amplitude by CR6 and CR7, buffered by Q40 before being applied to U601 pin 1 (divide by 3; divide by 4 prescaler).
- 2.16.2 For all other models, Q706 is a unity gain buffer, Q702 is a frequency tripler, and Q703 and Q704 are both frequency doubling stages. The overall frequency multiplication is a factor of 12. CR6, CR7, and Q40 are as described before. Low band and the other frequency bands differ so that the phase detector input frequencies may remain reasonably high and still achieve the desired channel spacings.

2.17 PRESCALER $\pm 3/ \pm 4$ (U601)

- 2.17.1 U601 is normally used to allow synthesizer operation from a 400 MHz or higher voltage controlled oscillator. In this paging synthesizer the highest frequency from Q40 is 174 MHz. U601 used in this application with frequency multipliers, allows all of the desired channel spacings to be achieved without resorting to excessively low phase detector (U603) input frequencies.
- 2.17.2 $\overline{\text{C0}}$ and $\overline{\text{C1}}$ (U601 pins 7 and 6) receive instructions from U604 via U602 as to how many cycles of its operation U601 should be in the divide by 4 mode during a loop pulse period (loop pulse is signaled from U602 pin 9 to U601 pin 5). In this manner an assortment of non-integer divisors are achieved. The total frequency divisor from CE1 pin 3 to U602 pin 9 is:

Low Band:
$$N_T = \frac{3(64A + 63B) + C}{3}$$

Other Bands: $N_T = \frac{3(64A + 63B) + C}{12}$

Where A and B are U603 divider programs, and C is the U601 program.

2.18 LOSS OF LOCK DETECTOR (U606, U607)

The loss of lock detector consists of two voltage comparators (both within U606); a reference loop detector and a main loop detector. The outputs of these are combined in U607, a quad OR-gate. The output of U607 is dc amplified by Q39, stored in delay capacitor C93, and used to inhibit transmitter keying by Q33 in the event of loss of lock. The delay time constant C93, R164 are used to prevent false transmission during acquisition of lock or other transient or oscillatory conditions. Q32 drives DS3 which provides a visual indication for out of lock condition.

2.19 BINARY MODULATOR (Q3-5, Q9-14, Q31, Q42, Q43, U22)

- 2.19.1 The binary modulator performs two functions:
 First, it translates data levels to precisely the peak-to-peak voltage level necessary for modulation of the main synthesizer loop via U21 pin 10. This is adjustable via R174. Secondly, it provides a dc level which is superimposed on the data applied to U21 pin 10. This level is adjustable (in the data enable mode) by R175. This dc level is necessary for the following conditions:
- To change the data levels, so they are symmetrical about the main loop dc control voltage for equal plus and minus frequency deviations.
- To change the data levels so they are not symmetrical about the main loop dc control voltage for unequal plus and minus frequency deviations, if desired.
- Q3,4,9,13, and 14 perform the first condition by switching R174 to either a fixed high level voltage (data "1") or a fixed low level voltage (data "0"). R174 is switched by either Q13 or Q14, but not both simultaneously. The resistance setting of R174 along with fixed resistors R137 and R134 determine the voltage amplification of op. amp. U22 for the data levels.
- 2.19.2 The circuit composed of Q5, Q31, Q42, and Q43 connects R175 into the circuit in the data enable mode. Switching transistors Q42 and Q43 are both on at the same time thus connecting R175 between regulated 9.6 V dc and ground. The voltage setting of R175 provides the adjustable dc level function mentioned above in the data enable mode. This voltage is summed with the data in the op. amp. U22 via R133 and R134 which provides unity gain for this level. DS2 provides a visual indication of the data enable mode.

2.20 DATA SIMULATOR (U23)

- 2.20.1 This circuit provides a simulated 300 bps data stream which, when selected by the rotary switch S1 (INSTANTANEOUS DEVIATION ADJUST position) on the synthesizer panel allows the peak-to-peak data deviation to be set using R174.
- 2.20.2 In the OFFSET ADJUST mode of rotary switch S1, a simulated data stream and a pulsating data enable are available. This allows for a convenient setting of the data bias, R175, by adjusting for minimum frequency transient upon change of data enable states (voice/tone to data, and vice versa). Final adjustment of R174 and R175 cannot be made until the +DEV (R176) and -DEV (R177) controls are set. The rotary switch must always be returned to the normal (OPERATE) position after servicing the station. An ADJUST MODE LED (DS3) is provided to indicate if the switch is not in the OPERATE mode.

2.20.3 U23 is a self contained RC oscillator and frequency divider. Oscillation of U23 is controlled by R139, R140, and C81. The frequency of oscillation determines the rate of the simulated data stream. Q34 buffers the simulated data for application to the binary modulator through the rotary switch when selected. U23 further frequency divides the oscillation frequency to provide a simulated pulsating data enable signal of approximately 1.5 Hz. This circuit is included as an aid to servicing and alignment, and is not normally activated during system operation.

3. SUMMARY

The paging synthesizer allows analog or digital (binary) modulation of paging base stations including low band, high band, and UHF. It not only provides do modulation capability, but high stability transmitter frequency at the same time; this is necessary for simulcast system applications.

4. ALIGNMENT PROCEDURE

4.1 GENERAL

Monitor the transmitter output frequency with an adequate frequency counter (typically accurate to ± 1 Hz). The transmitter modulation should be monitored with a Motorola Service Monitor (R1200) with a deviation meter or equivalent.

4.2 MULTIPLIER (Use a Motorola TEK-5 or equivalent metering panel.)

Step 1. Low Band — Peak L705 on Meter 3.

Step 1A. Other Bands —

- Peak L703 on Meter 1
- Peak L704 on Meter 2
- Peak L705 on Meter 3

Step 2. Repeat Step 1A.

4.3 14.4 MHz VOLTAGE CONTROLLED CRYSTAL OSCILLATOR (VCXO)

Adjust U18 warp coil (located through small hole on top of chassis, (see Figure 3) for 1.5 V ± 0.1 V dc at test point 1 (junction of C82 and R150). A high resistance voltmeter (11 megohm, R1002 or equivalent) must be used.

4.4 CHANNEL ELEMENT (CE1)

Step 1. Set the adjust mode switch on the synthesizer to the OPERATE mode. **DO NOT** apply any modulating signals.

Step 2. Set CE1 warp capacitor for $4.7 \text{ V} \pm 0.3 \text{ V}$ dc at test point 2 (junction of R151 and C83). Use a high resistance voltmeter as before. Refer to Figure 3 for location of tuning hole.

4.5 HIGH STABILITY OSCILLATOR (HSO)

The high stability oscillator (Y1) should be allowed to warm up for at least 30 minutes before proceeding any further. This is necessary for the oven in the oscillator to reach its operating temperature.

Step 1. Key the transmitter.

Step 2. Adjust the HSO to the assigned transmitter output frequency ± 10 Hz.

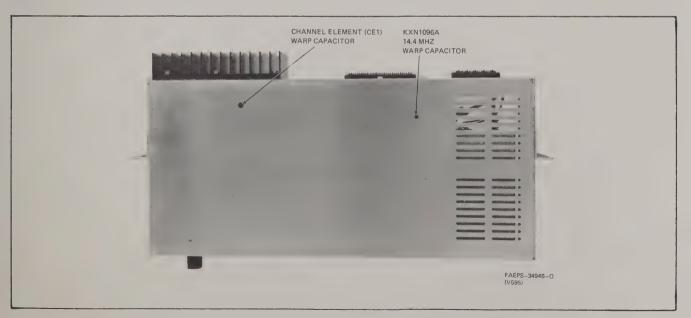


Figure 3. Synthesizer Tuning Adjustment Location

Step 3. Repeat paragraphs 4.3 and 4.4.

4.6 TSI MODULE (+ DEV and – DEV)

- Step 1. Set the panel switch on the synthesizer to the OPERATE position.
- Step 2. Set the switch on the TSI module to the TEST position.
- Step 3. Pulse Insertion Select the + deviation position of the switch on the TSI module. Set R176 (+ DEV) on the synthesizer panel for the transmitter output frequency of $F_T + 4.000 \, kHz$.
- Step 4. Pulse Blanking Select the deviation position of the switch on the TSI module. Set R177 (– DEV) on the synthesizer panel for transmitter output frequency of $F_{\rm T}-4.000~kHz$.
- Step 5. Return the TEST switch on the TSI module to the normal position.

4.7 INSTANTANEOUS DEVIATION ADJUST (R174)

Step 1. Set the panel switch on the synthesizer to the INSTANTANEOUS DEVIATION ADJUST mode. The adjust mode and data enable lamps should light. The transmitter is now modulated with simulated data.

Step 2. Set R174 on the synthesizer panel for $\pm 4.0 \,\mathrm{kHz}$ deviation.

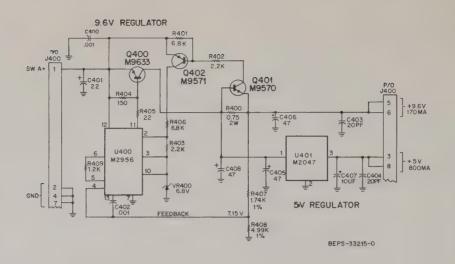
4.8 OFFSET (R175)

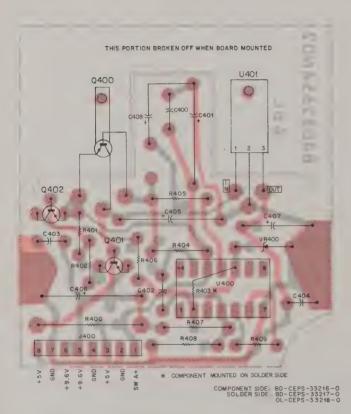
- Step 1. Disconnect the out-of-lock (transmitter inhibit) line to the station.
- Step 2. Set the panel switch on the synthesizer to the OFFSET ADJUST position. The adjust mode lamp should be lit, and the data enable lamp should be pulsating slowly.
- Step 3. Set R175 on the synthesizer for minimum transient or bounce on the transitions from no modulation to data modulation or vice-versa.
- Step 4. Re-connect the out-of-lock line to the station. The station should remain keyed. The out-of-lock lamp should not be lit.
- Step 5. Return the panel switch to the OPERATE position. The adjust mode lamp should not be lit, and the data enable lamp should be lit if the modem is detecting data.

4.9 HIGH STABILITY OSCILLATOR

Readjust the HSO if necessary and place the station back in service.







SHOWN FROM COMPONENT SIDE

parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
		capacitor, fixed; uF ± 10%;	
		unless otherwise stated	
C400	21-83596E13	.001; 500 V	
C401	23-84762H16	22; 20 V	
C402	21-83596E13	.001; 500 V	
C403, 404	21-11014H32	20 pF ± 5%; 100 V	
C405, 406	23-83214C31	47 ± 20%; 15 V	
C407	23-84762H03	10; 20 V	
C408	23-83214C31	47 ± 20%; 15 V	
		connector, plug:	
J400	28-83323N02	male; 8-contact	
		transistor: (see note)	
Q400	48-869633	PNP; type M9633	
Q401	48-869570	NPN; type M9570	
Q402	48-869571	PNP; type M9571	
		resistor, fixed: ohms $\pm 5\%$; 1/4 W;	
		unless otherwise stated	
R400	17-82036G13	0.75; 2 W	
R401	6-185A69	6.8k; 1/8 W	
R402, 403	6-185A57	2.2k; 1/8 W	
R404	6-11009A29	150	
R405	6-11009A09	22	
R406	6-185A69	6.8k; 1/8 W	
R407	6-10621C18	1740 ± 1%	
R408	6-10621C62	4990 ± 1%	
R409	6-185A51	1.2k; 1/8 W	
		integrated circuit: (see note)	
U400	51-83629M56	regulator; 9.6 V	
U401	51-84320A47	regulator; 5 V	
		voltage regulator: (see note)	
VR400	48-82256C37	Zener; 6.8 V; 1 W	

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

TRN5058A Voltage Regulator Board Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34965-O 7/14/82 - V&G

DESCRIPTION

fixed: 50-10%; 35 V -20%; 25 V 5; 200 V 50-10%; 35 V 1%; 100 V

note)

tifier; 200 V

(see note) M9642 M9428

ed: ±5%; 1/4 W: erwise stated

ulator: (see note) 6.8 V

achine; 6-32 x 5/16''; 2 used ; 2 used

PL-8111-0

DESCRIPTION

xed: 00 – 10%; 100 V

V; slow blow type

see note) 19627

lide

WHT, BLK-GRN; res. 29 ohms (EL, BLK-RED; res. 32 ohms BRN-YEL with BLK center top;

ard:

olug:

11/32 × 1/8"; 4 used tchine: 6-32 × 5/8"; 2 used ping: 4-40 × 5/16"; 4 used ping: 4-40 × 1/4"; 4 used ping: 6-32 × 5/16"; 4 used ping: 6-32 × 38"; 6 used houlder; 2 used useholder heat sink mounting; 2 used LE, fused ansistor; 2 used LE, female; 3 contact 3, transistor

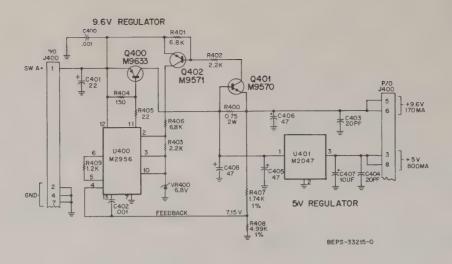
socket; 3 used

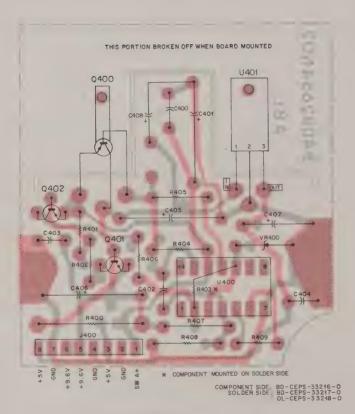
plug; 3 used 10 used 6 used RNING PLUG AC

terminal; 4 used

tors, and integrated circuits must

TRN5470A Power Supply Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34988-O 7/14/82 - V&G





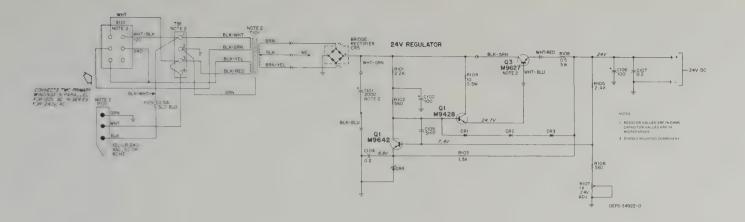
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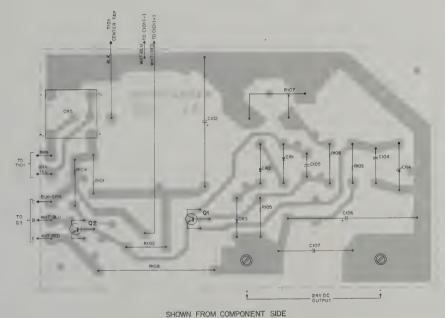
parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
		capacitor, fixed: uF ± 10%;	
		unless otherwise stated	
C400	21-83596E13	.001; 500 V	
C401	23-84762H16	22; 20 V	
C402	21-83596E13	.001; 500 V	
C403, 404	21-11014H32	20 pF ± 5%; 100 V	
C405, 406	23-83214C31	47 ± 20%; 15 V	
C407	23-84762H03	10; 20 V	
C408	23-83214C31	47 ± 20%; 15 V	
		connector, plug:	
J400	28-83323N02	male; 8-contact	
		transistor. (see note)	
Q400	48-869633	PNP; type M9633	
Q401	48-869570	NPN; type M9570	
Q402	48-869571	PNP; type M9571	
		resistor, fixed: ohms ±5%; 1/4 W;	
		unless otherwise stated	
R400	17-82036G13	0.75; 2 W	
R401	6-185A69	6.8k; 1/8 W	
R402, 403	6-185A57	2.2k; 1/8 W	
R404	6-11009A29	150	
R405	6-11009A09	22	
R406	6-185A69	6.8k; 1/8 W	
R407	6-10621C18	1740 ± 1%	
R408	6-10621C62	4990 ± 1%	
R409	6-185A51	1.2k; 1/8 W	
		integrated circuit: (see note)	
U400	51-83629M56	regulator; 9.6 V	
U401	51-84320A47	regulator; 5 V	
		voltage regulator: (see note)	
VR400	48-82256C37	Zener; 6.8 V; 1 W	

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

TRN5058A Voltage Regulator Board Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34965-O 7/14/82 - V&G





COMPONENT SIDE 8D-CEPS-34923-0 OL-CEPS-34924-0

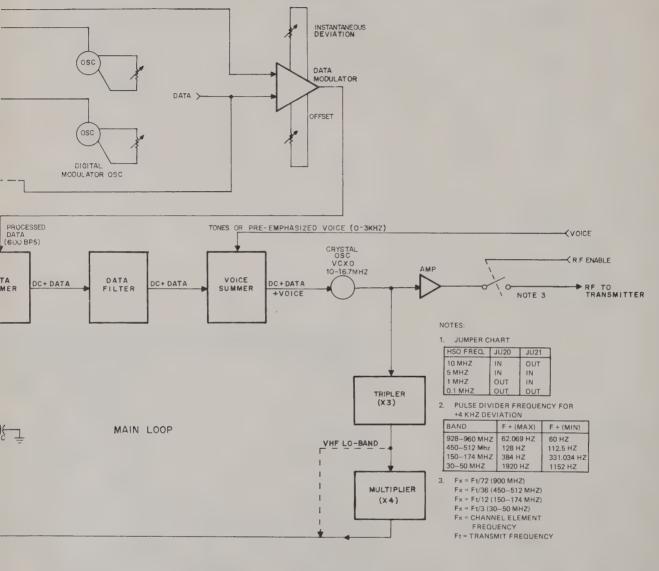
parts list

REFERENCE	MOTOROLA PART NO.	DESCRIPTION	
		capacitor, fixed:	_
C102	23-82077C01	100 uF + 150-10%; 35 V	
C102	21-82372C05	0.2 uF + 80-20%; 25 V	
C104	21-84493B27	51 pF ± 5%; 200 V	
C106	23-82077C01	100 uF + 150-10%; 35 V	
C110	8-82317B01	0.1 uF ± 10%; 100 V	
		diode: (see note)	
CR1, 2, 3	48-83654H01	silicon	
CR5	48-84621E05	bridge, rectifier, 200 V	
		transistor: (see note)	
Q1	48-869642	NPN; type M9642	
Q2	48-869428	NPN; type M9428	
		resistor, fixed: ±5%; 1/4 W:	
		unless otherwise stated	
R101	6-11009A57	2.2k	
R102	6-11009A43	560	
R103	6-11009A53	1.5k	
R104	6-125C01	10; 1/2 W	
R105	6-11009A58	2.4k	
R106	6-11009A43	560	
R107	18-83168C03	variable; 1k	
R108	17-82586H08	W.W. 0.5; 5 W	
		voltage regulator: (see note)	
VR1	48-82256C02	Zener type; 6.8 V	
		echanical parts	
	3-84482M01	SCREW, machine; 6-32 x 5/16"; 2 used	
	29-83362G01	TERMINAL; 2 used	

REFÈRENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C101	23-83093G21	capacitor, fixed: 2000 uF + 100 - 10%; 100 V
F101	65-475395	fuse: 1/2 amp: 125 V; slow blow type
Q3	48-869627	transistor: (see note) NPN; type M9627
S101	40-84241G03	switch: 2 position; slide
T101	25-83043L01	transformer: prl: #1 BLK-WHT, BLK-GRN; res. 29 ohms prl:#2 BLK-YEL, BLK-RED; res. 32 ohms sec: BRN, BRN-YEL with BLK center top; res. 1 ohm
TB1	31-120965	terminal board: 4 contact
P101	28-83176L01	connector, plug: male; 3-contact
	m	echanical parts
	2-119913 3-122922 3-134212 3-134169 3-135575 3-136575 3-136934 4-844093 7-83181LD1 9-82083C03 9-82673AD1 9-82673AD1 9-82673AD1 9-82673AD1 9-82673AD1 9-82673AD1 9-82673AD1 9-82673AD1 9-82673AD1 9-82673AD1 9-8273AD1 9-	NUT, 8-32 x 11/32 x 1/8"; 4 used SCREW, naphine, 6-32 x 5/8"; 2 used SCREW, tapping: 4-40 x 5/16"; 4 used SCREW, tapping: 4-40 x 5/16"; 4 used SCREW, tapping: 4-62 x 5/16"; 4 used SCREW, tapping: 6-32 x 38"; 6 used WASHER, shoulder, 2 used BRACKET, tuseholder BRACKET, heat sink mounting; 2 used BRACKET, that sink mounting; 2 used RECEPTACLE, fursale; 3 contact INSULATOR, transistor HEAT SINK TERMINAL, socket; 3 used LUG, tongue TERMINAL, plug; 3 used STRAP, tie; 10 used
	42-83123F01 54-84789L01 30-83211C04 37-107998	RETAINER; 6 used LABEL, WÄRNING CABLE and PLUG AC SLEEVING LUG, crimp!terminal; 4 used

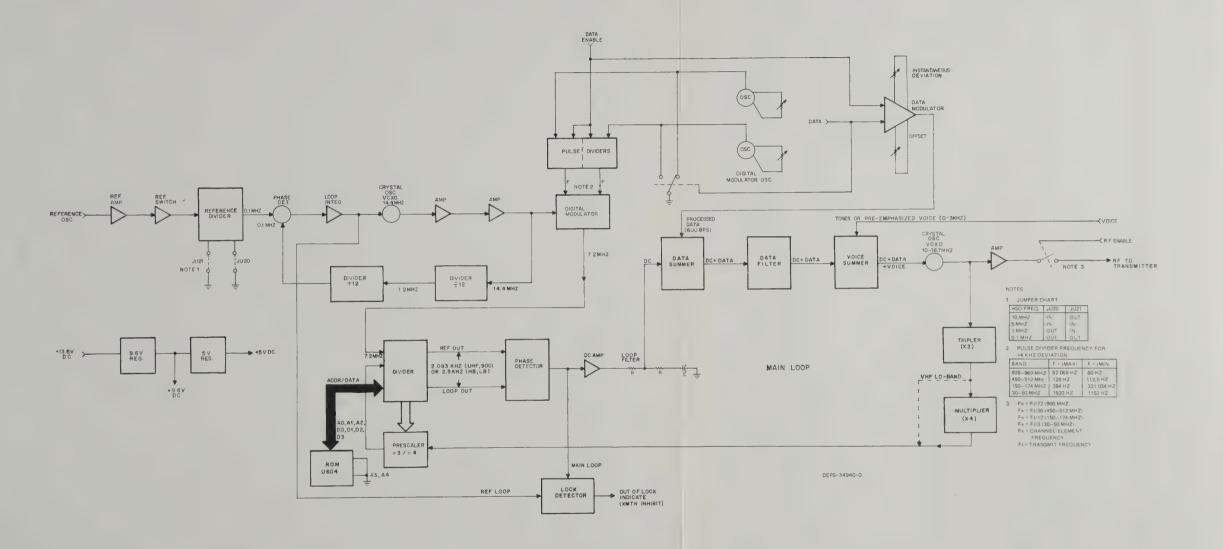
note: For optimum performance, diodes, translators, and integrated circuits must be ordered by Motorola part numbers.

TRN5470A Power Supply Schematic Diagrar
Circuit Board Detail, and Parts List
Motorola No. PEPS-34988-0
7/14/82 · V&G

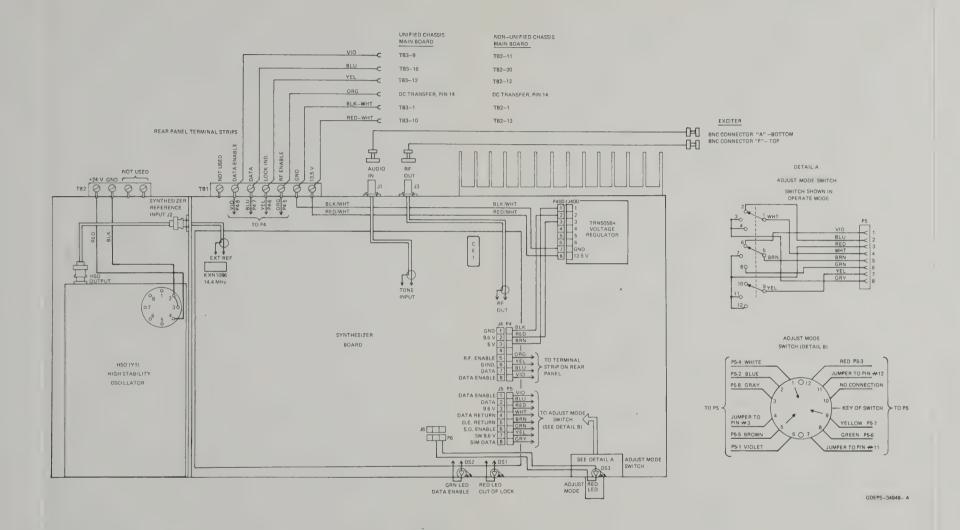


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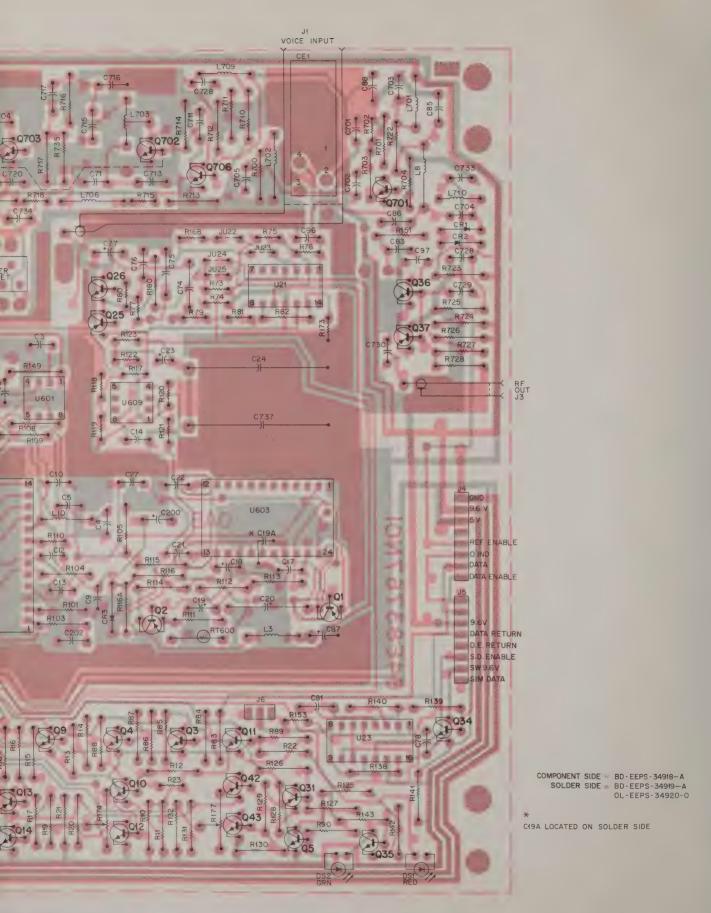
Paging Synthesizer Intercabling Diagram Motorola No. GDEPS-34949-A 10/5/82 · V & G



Paging Synthesizer Block Diagram Motorola No. DEPS-34940-O 7/14/82 - V&G



Paging Synthesizer Intercabling Diagram Motorola No. GDEPS-34949-A 10/5/82 · V & G



egrated circuits on this board are TTL & CMOS devices

types and connections for this board are as follows

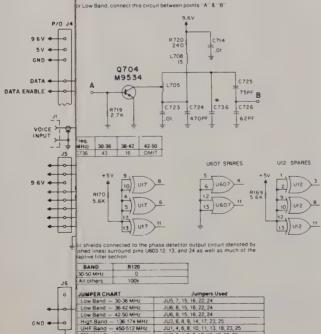
efere		Туре	vcc	Gnd	Migr's Description
		71K76	14	7	Dual Timer
5, 6.	7.8	84L38	16	8	Presettable - N Counter
		61L04	14	7	Quad 2-Input NAND Gate
J2		61L15	14	7	Dual D Flip-Flop
مار		27M11	14	7	Quad 2-Input NAND Gate
RNAL THE		48M23	14	7	Quae 2-Input Exclusive OR Gate
]		61L15	14	7	Dual D Flip-Flop
± 15		61L10	5		Decade Counter
		71K37	16	8	Dual 4-Input Multiplexer
		09M79	14	7	Quad 2 Exclusive OR Gate
		91B02		-	14 4 Osc
20		61L85	5	6. 7. 10	One - 12 Counter
		29M81	4	11	Quad Op Amp
		29M32	8	- 4	Dual Op Amp
		84L62	16	8	Programmable Timer
		68F68	_	4	- 3 - 4 Prescaler
2		68F63	10	4	Prog Divider
3		68F59	18	16	Sample & Hold Phase Det
		89L03	16	8	ROM
5		71K74	3	12	Quad Comparator
7		71K94	14	7	Quad 2 Input OR Gate
9		29M32	14	7	Dual Op Amp

JU21	JU20	External Reference
IN	IN	5 MHz
OUT	IN	10 MHz
IN	OUT	1 MHz
OUT	OUT	100 kHz

Band C80

I the meter selection switch to positon D for multiplier tuning

30-50 M All Othe		pF		
Band (MHz)	C42	C43	R25	R26
30-36	4000	4000	9090	9090
36-42	3900	3900	8660	8660
42 50	4700	4700	8450	8450
VHF				



Paging Synthesizer Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34989-O (Sheet 2 of 2) 7/14/82 - V&G

parts list

TLB8502A Synthesizer Board, 30-36 MHz TLB8503A Synthesizer Board, 36-42 MHz

RN5446A Synthesizer Interconnect Cable						
REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION				
DS3	48-88245C04	light emitting diode: (see note) RED LED				
		connector, plug:				
P2	28-83099K01					
P4		consists of:				
	15-83142M07	housing, 8-position				
	39-82717M01	contact, receptacle; 7 used				
P5		consists of:				
	15-83142M07	housing, 8-position				
	39-82717M01	contact, receptacle; 8 used				
PS	-	consists of:				
	*5-54301K19	housing, 3-position				
	3982°17M01	contact, receptacle; 2 used				
	28-84302K01	plug, polarizing				
P7	28-83099K01					
P400	-	consists of				
	15-83142M07	housing, 8-position				
	39-82717M01	contact, receptacle; 5 used				
		switch, rotary:				
S1	40-84869K01	3-position				
		terminal board:				
781	31-82272B04	7-screw terminal				
		referenced items				
	1-80757D24	FEED-THRU ASSEMBLY				
	30-83794C01	CABLE, coaxial WHT, 5.75" used				
	3-135941	SCREW, machine: 6-32 x 1/2"; 4 us	ed			
	42-10217A02	STRAP, tie: 5 used				
	42-10217A03	STRAP, tie, 4 used				

REFERENCE	MOTOROLA PART NO.	DESCRIPTION
		oscillator, crystał:
* '		not find serviceable
	non	referenced items
	3-134212	SCREW tapping: 4-40 × 5/16"; 14 used
	1 6(159D38 41 84811B01	CO.ER syrines zer pottom no udes
	42 84, 64801	RETAINER 14 sed
	2.8364	NJT hex 3.8 32 x 1 2 x 3 32
	211.2616	NuT her 6 32 + 14 + 132 + 18 4 used
	3 952.9	SCREW machine 832 + 38 6 used
	3 1 14 186	SCREW tags no 6 32 x 1.4 6 used
	3 134309	SCREW, tapping 4 40 4 3 16 2 4880
	3-135502	SCREW, tapping: 4-40 x 5/8"; 2 used
	3 136850	SCREW 'apping: 6 32 x 1'2" 10 used
	7 8 18 4NC*	BRA KET is kmounting 2 used
	15 H4. 1"A6"	NS ILATOR transistor
	Harman, to "	HEAT . NH
	THE PARTY	CHASS S man
	32 H36 BNG1	
	30 H. 196HC1	
	30 x xx 19tyn 1	GASKE*
	36 × + 145"	MNRB contro
		STANDOFF 2 used
	2 x 438 N 1	SPACER

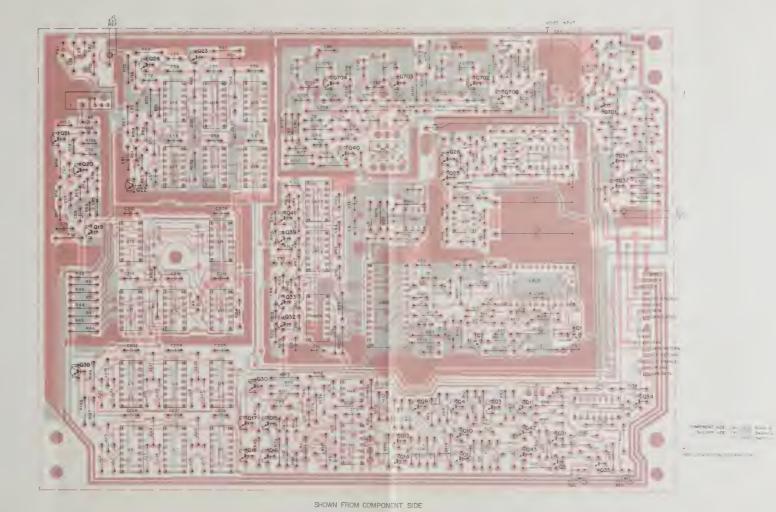
REFERENCE SYMBOL	PART NO.	DESCRIPTION				
		oscillator, crystal:				
* 1		not timed serviceable				
		order white x t when replacing				
	non	referenced Items				
	3-134212	SCREW tapping: 4-40 x 5/16"; 14 used				
	1 of 159D38	CO.ER synthesizer action includes				
	41 84811801	SPR NS				
	42 84, 84861	RETAINER 14 used				
	2.8364	NJT he: 3.8 32 : 1 2 : 3 32				
	211.2616	N. T hes 6 32 = 14 = 3 32 = 18 4 used				
	3 968.9	SCREW maining 8 32 x 36 6 used				
	3 1 14 186	SCREW tapping 6 32 x 1.4 6 used				
	3 134309	SCREW, tapping 4 40 4 3 16 2 4880				
	3-136502	SCREW, tapping: 4-40 x 5/8"; 2 used				
	3 136850	SCREW *apping: 6 32 x *'2" 10 used				
	7 8 18 4NC*	BRA KET ra kimounting 2 used				
	15 H4, 1"AC"	NS ILATOR transistor				
	76 w we 24 "	HEA" . NH				
	THE BUTT	CHASSIS man				
	32 H 59/18/NOT	GATHET				
	32 H. 196HE1	GASAE" 41 used				
	30 uniquests	GASKS*				
	36 × 6 145"	VINITE CONTO				
	4 1 8 4 6 4 0 9	STANDOFF 2 used				
	& PARTIN T	SPACER				

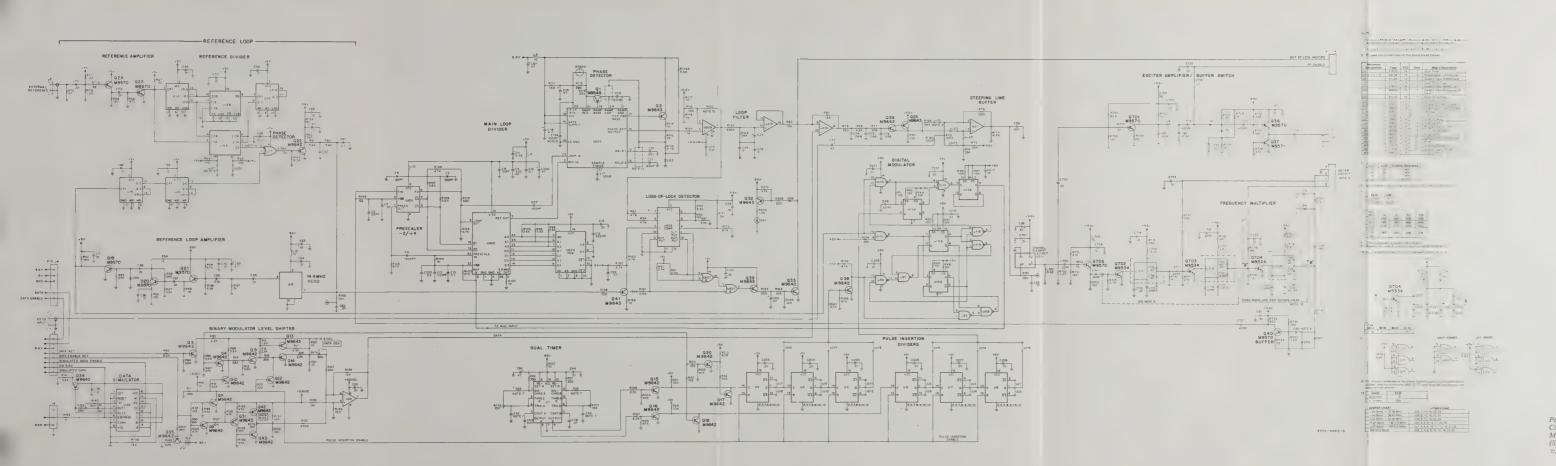
Paging Synthesizer Schematic Diagram, Circuit Board Detail, and Paris List Motorola No. PEPS-34989-0

7/14/82 - V&G

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	-
		capacitor, fixed: uF ± 10%; 100 V: unless otherwise stated	L3	24-82723H07	coll, rf: choke; 10 uH	R91, 92 R93, 94	6-11009E58 8-11009E65	2.4k 4.7k	B73
C2	21-11014H32	20 pF ± 5%; 50 V	LB	24-82723H07	choke: 10 uH	R95	6-11009E57	2.2k	R73
33 33	21-11015A07	.01 + 80-20%; 100 V	L9, 10	24-83961B01	3 turns	R96	6-11009E75	12k	R73
24 25	21-11014H32	20 pF ± 5%; 50 V	L13	24-82723H07	choke; 10 uH	R97 R98, 99, 100	6-11009E66 6-11009A67	5.1k 5.6k	
5 8	21-11015805 21-82187844	220 pF 1000 pF	L701 1.702	24-82723H07 24-80900A61	choke; 10 uH choke; 0.62 uH	H98, 99, 100 R101	6-11009A67 6-11009A49	5.6K 1k	RT
8	21-11014H32	20 pF ±5%;50 V	L705	24-84972A15	variable; 4-1/2 turns (RED); 30-50 MHz	R103	6-11009A35	270	
9	21-11015805	220 pF	L708	24-82549009	choke; 15 uH (30-50 MHz)	R104	8-11009A49	1k	U1
10	8-11017817	0.1;50 V	L709	24-82723H07	choke; 10 uH	R105	6-11009A65	4.7k	U3
11	23-11013F10 21-11015B05	0.56; 35 V 220 pF	L710	24-82723H03	choke; 23 uH	R106 R107, 108	6-11009A41 6-11009A67	470 5.6k	U9
12 13	8-11017B17	0.1: 50 V			transistor (see note)	H107, 108 R109	6-11309A67	4.7k	U10
14	21-11015A07	.01 + 80-20%	Q1	48-869548	PNP; type M9548	R110	6-11009E45	680	61 01:
15	21-11015B05	220 pF ± 5%	Q2	48-869643	PNP; type M9643	R111	6-11009A29	150	U1:
16	21-11015A07	.01 + 80-20%	Q3, 4, 5	48-869642	NPN; type M9642	R112	6-11009A39	390	U14
17 18	8-11017B07 23-11013D55	.0068; 50 V 4.7 ± 20%, 20 V	Q9, 10, 11, 12 Q13	48-869642 48-869643	NPN; type M9642 PNP, type M9643	R113 R114	6-11009A33 8-11009A01	220	U16
9	23-84538G06	47 ± 20%; 20 V	Q14 thru 18	48-869642	NPN; type M9642	R115	6-11009A56	2k	U17 U18
9A	21-11015801	100 pF	Q19, 20, 21	48-869570	NPN; type M9570	R116	6-11009A59	2.7k	U1
10	8-80027808	.0039 ±5%	Q22	48-869642	NPN: type M9642	R116A	6-11009A67	5,8k	U2
1	8-11017B06	.0047, 50 V	Q23, 24	48-869570 48-869643	NPN; type M9570 PNP; type M9643	R117, 118 R119	6-11009E49 6-11009E73	1k 10k	U2
2	8-11017B01 23-84538G14	.001; 50 V 1: 35 V	Q25 Q26	48-869643 48-869642	NPN; type M9642 NPN; type M9642	R120	6-11009B23	82k	U2
3	8-80026B02	1; 35 V 5: 50 V	Q30	48-869642	NPN, type M9642 NPN, type M9642	R121	6-11009E49	1k	U60 U60
5	21-11015A07	.01 + 80-20%	Q31, 32	48-869643	PNP; type M9643	R122	6-11009F10	330k	U60
6	21-11015A07	.01 + 80-20%	Q33, 34, 35	48-869642	NPN, type M9642	R123	6-11009E87	39k	LI60
7	21-11015801	100 pF	Q36	48-869570	NPN; type M9570	R125, 126	6-11009A89	47k	U60
3	8-80026802	5; 50 V	Q37 Q38, 39	48-869571 48-869642	PNP; type M9571 NPN; type M9642	R127 R128	6-11009A73 6-11009A89	10k 47k	U60
	21-863396 21-82537B49	4000 pF ± 1%, 500 V (30-38 MHz) 3900 pF ± 1% (36-42 MHz)	Q38, 39 Q40	48-869642 48-869570	NPN; type M9570 NPN; type M9570	R129	6-11009A73	10k	U60
	8-11017A06	4700 pF ± 5%: 50 V (42-50 MHz)	Q41, 42	48-869643	PNP: type M9643	R130	6-11009A89	47k	
3	21-863396	4000 pF ± 1%; 500 V (30-36 MHz)	Q43	48-869642	NPN, type M9642	R131, 132	6-11009A73	10k	
	21-82537B49	3900 pF ± 1% (38-42 MHz)	Q701	48-869570	NPN; type M9570	R133	6-11009B14	36	
	8-11017A06	4700 pF ± 5%; 50 V (42-50 MHz)	Q704	48-869534	NPN; type M9534	R134 thru 136 R137	6-11009A77 6-11009A84	15k 30k	
4, 45	21-11015A07 21-11014A44	.01 + 80-20% 62 pF ± 5%	Q706	48-869570	NPN; type M9570	R137 R138	6-11009A84 6-11009A77	30k 15k	
8 4 thru 60	21-11014A44 21-11015A07	.01 +80-20%			resistor, fixed: ±5%; 1/4 W:	R139	6-11009A91	56k	
1, 62	21-82372C09	0.1 + 80-20%; 25 V			unless otherwise stated	R140	6-11009A99	120k	
6 :	323-84538G23	.01 + 80-20%	R9	6-11009A25	100	R141	6-11009A67	5.6k	
4 thru 58	21-11015A07	.01 + 80-20%	R10	6-11009A49	1k	R142 R143	6-11009A44 6-11009A87	620	
9	23-11013D55	4.7 ± 20%, 20 V	R11	6-11009A97 6-11009A81	100k 22k	R143	6-11009A87 6-11009F87	39k 39k	
0 thru 73	21-11015A07 8-83813H23	.01 + 80-20% .068 ± 5%; 50 V	R12 R13, 14	6-11009A81 6-11009A87	5.6k	R144	6-11009E87	68k	
4 5	8-83813H37	.068 ± 5%; 50 ¥	R15, 14	6-11009A55	1.8k	R146	6-11009A65	4.7k	
	21-84426848	665 pF + 5° = 500 V	R16	6-11009A61	3 3k	R147	6-11009A59	27k	
7	23-84538G29	47 ± 20%, 10 V	R17	6-11009A57	2.2k	R148	6-11009A89	47k	
8, 79	21-11015A07	.01 +80-20%	R18	6-11009A87	39k 2.2k	R149 R150	6-11009A19 6-11009E73	56 10k	
	8-11017801	.001; 50 V (30-50 MHz)	R19 R20, 21	6-11009A57 6-11009A49	2.2k 1k	R151	6-11009E73	10k	
2 83	8-82905G03	047 ± 5%; 50 V 01 + 80 20° o	H20, 21 R22	6-11009A49	10k	R152	6-11009E01	10	
4	23 84538G29	47 = 20° × 10 V	R23	6-11009E81	22k	R153	6 11009E49	1k	note:
5.86	21-84494829	47 ± 20%, 10 V 10 pF ± 5% 500 V	R24	6-11009A37	330	R154	6-11009E23	82	note:
7 88	23-84538G29	47 ± 20° , 10 V	R25	6-84376L15	9090 ± 0 5% (30-36 MHz)	R155 R156	6-11009E71 6-11009E67	8 2k 5 6k	00 010
9	21 11015A07	01 + 80 20%		6-84376L14 6-84376L13	8660 ± 0.5% (36-42 MHz) 8450 ± 0.5% (42.50 MHz)	R157	6-11009E18	51	
	21 11015A07 23-84538G29	01 + 80 20° o 47 + 20° o, 10 V	R26	6-84376L13	9090 ± 0.5% (30-36 MHz)	R158	6-11009E73	10k	
95	21 11015A07	01 + 80 20°	1120	6-84376L14	8660 ± 0 5% (36 42 MHz)	R159	6 11009E01	10	
6	B 11017B01	001 50 V		6-84376L13	8450 ± 0 5% (42-50 MHz)	R160	6-11009E65	47k	
	21 11015A07	01 - 40 2000	R27	6-11009E37	330	R161	6-11009E58 6-11009E59	2 4k 2 7k	
1	23.845386,06	4" + 20% 20 V	R39	6 11009A73	10k 47k	R162 R163	6-11009E59 6-11009E33	2 /k 220	
	21 11015A07 21 82372C04	01 + 80 20 ° a 05 + 80 20 ° a 25 V	R40 R40A	6-11009A89 6-11009E89	4/K 47k	R164 165	6 11009E73	10k	
	21 82372C04 21 11015A07	05 + 80 20° + 25 V 01 + 80 20° +	R41	6-11009E73	10k	R166, 167	6 11009E71	8 2k	
thru 703	21 11015A07	01 + 80 20%	R42 thru 51	6-11009A73	10k	R 168	6 11009E91	56k	
4	21 11015801	100 pF	R52	6-11009A39	390	R169, 170	6-11009E67	5 6k	
	21 84493802	22 pF ± 5% 50 V	R53 `	6-11009E59	2 7k	R171 R172	6 11009E75 6 11009E72	12k 9 1k	
1	21 8 3406 0 44	47 pF + 5% 50 V 01 + 80 20%	R54 R55	6-11009E49 6-11009E25	1k 100	R173	6-11009E65	4 7k	
	21 11015A07 21 11015A07	01 + 80 20% 01 + 80 20% (30 50 MHz)	R56	6-11009E82	24k	R174	18-84143N06	variable, 50k	
i.	21-11015B09	470 pF	R57	6-11009E81	22k	R175, 176, 177	18-84143N01	variable, 10k	
5	21-82204B64	75 pF ± 5%; 50 V (30-50 MHz)	R58	6-11009A49	1k	R180	6-11009E97	100k	
6	21-82610C42	62 pF ± 5%; 50 V (30-50 MHz)	R59	6-11009E65	4.7k	R208 R209	6-11009E81 6-11009E51	22k 1.2k	
	21-11014H41	47 pF ±5%	R60, 61	6-11009A67	5.6k	R209 R210	6-11009E51 6-11009E89	1.2K 47k	
3, 730	21-11015A07	.01 + 80-20%	R62 R63	8-11009A43 8-11009E73	560 10k	H210 H211	6-11009E89	10k	
9	21-11015B01 21-82355B82	100 pF 1 pF ± 0.25 pF; 50 V	H63 R64, 65	6-11009E73	10k	R212	6-11009A89	47k	
1 2. 733	21-82355862 21-11015A07	01 + 80-20%	R66	6-11009A73	470	R213	6-11009A65	4.7k	
5	21-82204B29	43 pF ± 3%, 50 V (30-36 MHz)	R67, 68	6-11009A29	150	R214	6-11009A73	10k	
	21-83406D93	16 pF ± 5%; 50 V (36-42 MHz)	R70, 71	6-11009A51	1.2k	R700	6-11009A57 6-11009A95	2.2k 82k	
17	21-11015A05	.01 + 80-20%	R71A	6-11009A18	51 47	R701 R702	6-11009A95	82X 12k	
		disdoctors and a	R72 R73, 74	6-11009A17 6-11009E87	47 39k	R702	6-11009A18	51	
. 2	48-83510F03	dlode: (see note) silcon	H/3, /4 R75	6-11009E97	100k	R704	6-11009A29	150	
	48-83510F03 48-83329G02	silicon	R78	6-11009E99	120k	R710	6-11009A85	4.7k	
	48-82178A01	germanium	R77	6-11009E88	43k	R711 R712	6-11009A53 6-11009A18	1.5k 51	
	48-83854H01	silicon	R78	6-11009E84	43k	R712 R713	6-11009A18 6-11009A29	150	
,7	48-84616A04	hot carrier	R79	6-11009E39	390 10k	H713 H719	6-11009AZ9	2.7k (30-54 MHz)	
	48-83654H01	silicon	R80 R81	6-11009E73 6-11009E77	10k 15k	8720	6-11009E34	240	
		Make amitting diada: /gan make)	R81 R82	6-11009E// 6-11009A77	15k 15k	R722	6-11009A49	1k	
	48-88245C04	light emitting diode: (see note) red	R83, 84	6-11009A67	5.6k	R723	6-11009A57	2.2k	
	48-88245C06	dissu	R85	6-11009A57	2.2k	R724,725	6-11009A49	1k	
			R86	6-11009A67	5.6k	R726	6-11009A61 6-11009A39	3.3k 390	
				6-11009A89	47k	R727			
		connector, receptacle:	R87				6-11009A61	3.3ic	
.3	9-84968D01 28-82622L07	connector, receptacle: female; single contact male: 8 confact	R87 R88 R89	6-11009A89 6-11009A87 6-11009A89	5.6k 47k	R728 R729	6-11009A61 6-11009A73 6-11009A42	3.3k 10k	

REFERENCE MOTOROLA SYMBOL PART NO.		DESCRIPTION		
R731	6-11009A77	15k		
R732	6-11009A53	1.5k		
R733	6-11009E47	820		
R734	6-11009A09	22		
		thermistor:		
RT600	8-858402	1k @ 25°C		
		Integrated circuit: (see note)		
U1	51-84371K78	dual timer		
U3 thru 8	51-82884L38	presettable - N counter		
U9	51-84561L04	guad 2-input NAND gate		
U10	51-84561L15	dual "D" flip-flop		
U11	51-83627M11	guad 2-input NAND gate		
U12	51-82848M23	guad 2-Input exclusive OR gate		
U13	51-84561L15	dual "D" flip-flop		
U14, 15	51-84561L10	decade counter		
U16	51-84371K37	dual 4-line to 1-line multiplexer		
U17	51-82609M79	guad 2 exclusive OR gate		
U18	51-80291B02	14.4 oscillator		
U19, 20		1 – 12 counter		
	51-84561L85			
U21	51-83629M81	quad op amplifler		
U22	51-83629M32	dual op amplifier		
U23	51-82884L62	programmable timer		
U601	51-84768F68	prescaler		
U602	51-84768F63	programmable divider		
U603	51-84768F59	sample and hold phase detector		
U604	TRN5481A	ROM (Specify Customer Frequency)		
U606	51-84371K74	quad comparator		
U607	51-84371K94	quad 2-input OR gate		
U609	51-83629M32	dual op amplifler		
	non	referenced items		
	3-134212	SCREW, tapping: 4-40 × 5/16"; 6 used		
	9-84924E02	IC SOCKET; 16 pin		
	9-84207B01	METERING TRAY; 7 pln		
	26-84030N01	SHIELD, wall multiplier		
	26-84031N01	SHIELD, wall binary modulator		
	26-84032N01	SHIELD, component side loop filter		
	26-84055N01	SHIELD, multi solder side multiplier		
	26-84056N01	SHIELD, driver solder side divider		
	26-84061N01	SHIELD, component side ref. amplifier		
	26-84062N01	SHIELD, component side ref. loop		
	26-84063N01	SHIELD, component side binary modulato		
	26-84072N01	SHIELD, component side phase detector		
	26-84093N01	SHIELD, solder side ampl		
	26 84094N01	SHIELD solder's de loop filter		
	26-84095N01	SHIELD, solder side of 1000		
	26-84248802	SHIELD, can		
	42-84284801	RETAINER: 6 used		
	29-80014A01	CLIP, coaxial, 3 used		
	30-83794C01	CABLE coaxia: WHT		





Paging Synthesizer Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34989-Q (Sheet 2 of 2) 7/14/82 - V&G





JUMPER AND CABLE CONNECTIONS

FOR TDN6869A/70A MODEMS

Communications Sector

1. GENERAL

Before either of these modems can be used, certain jumpers within the modem must be placed in the proper position to ensure correct operation with the paging station

2. JUMPER POSITIONING

Remove the housing from the modem and position the jumpers as follows:

Jumper	Position
Carrier Detect Level	- 30 dBm Level
Carrier Detect Delay	6 msec. Option
4-Wire/2-Wire Operation	4-Wire Only

Reinstall the modem housing.

3. CABLE CONNECTIONS

Refer to schematic diagram PEPS-35122 for information on how to connect the two cables supplied.

4. MODEM OPERATION

The front panel rotary switch must be in the DATA position, and the rear panel power switch placed in the ON position for proper operation of the modem. Refer to the separately supplied modem instruction manual for further information.

parts list

TLD9333A Synthesizer Board, 150-174 MHz TLE5493A Synthesizer Board: 450-512 MHz REFERENCE MOTOROLA SYMBOL PART NO REFERENCE MOTOROLA REFERENCE MOTOROLA DESCRIPTION SYMBOL DESCRIPTION PART NO. CVMBOI DESCRIPTION capacitor, fixed: uF ± 10%: 100 V: connector recentacle: 6-11009467 unless otherwise stated female; single contac 20 pF ± 5%, 50 V J4, 5 28-826221.07 male: 8 contact 01 + 80-20% 100 V male; 3 contact 6 11000 400 20 pF + 5% 50 V 6-11009A67 21-11015B05 21-82187844 1000 oF choke; 10 uH 6-11009A73 20 pF ± 5%, 50 V L8 L9, 10 24-82723H07 24-83961B01 choke; 10 uH R91.92 6-11009F58 3 turns L9, 10 L13 L701 L702 L703 L704 L705 L706 8-11017817 24-82723H07 choke; 10 uH R95 R96 6-11009E57 0.56.35 V choke; 10 uH 6-11009F75 choke 0.82 uH 8-11017B17 tunable: 4-1/2 turns (RED) R98, 99, 100 6-11009A67 01 + 80-20% 220 pF ± 5% 24-83857G08 6-11009A49 21-11015B05 24.92967009 variable; 3-1/2 tums (VIO 24-82549D09 choke: 15 µH R104 R105 6.110000440 8-11017807 0068, 50 V 4.7 ± 20%, 20 V L707, 708 24-82835G08 6-11009A65 23-11013055 L709 24-82723H07 choke 10 uH 6-11009A41 23-84538G06 47 ± 20%, 20 V 24-82723H03 choke: 23 uH R107, 108 6-11009A67 21-11015801 D100 6-11009A65 8.80027808 0039 ± 5% 6-11009E45 8-11017806 0047. 50 V 48-889548 PNP, type M9548 6-11009A29 PNP; type M9643 D112 6-11009A39 6-11009A33 Q3, 4, 5 48-869642 Q9, 10, 11, 12 48-869642 23-84538G14 1. 35 V 5.50 V NPN; type M9642 R114 01 + 80-20% PNP: type M9843 B115 6-11009A56 6-11009A59 01 + 80-20% 48-869642 NPN: type M9642 R116 21 11015801 100 oF 48-869570 NPN; type M9570 NPN; type M9642 48-869642 R117 118 6-11009E49 C42, 43 C44, 45 3900 pF ± 1% NPN: type M9570 R119 8-11009E73 01 + 80-20% 48,869643 PNP: type M9643 21 11014A44 62 nF + 5% 48,869642 NPN: type M9642 R121 R122 6-11009E49 Q30 Q31, 32 Q33, 34, 35 Q36 C54 thru 60 NPN: type M9642 6-11009E10 C61 62 21-82372009 0.1 + 80-20% 25 V 48-869643 PNP; type M9643 48-869642 01 + 80-20% NPN; type M9642 R125, 126 6-11009A89 01 + 80-20% 48-869570 NPN: type M9570 R127 6-11009A73 47 ± 20%, 20 V Q37 Q38, 39 R128 6-11009A89 C70 thru 73 48-869642 48-869570 01 + 80-20% NPN; type M9642 6-11009A73 Q40 Q41, 42 Q43 Q701 Q702, 703 8-83813H23 068 ± 5%: 50 V NPN: type M9570 R130 R131, 132 6-11009A89 PNP; type M9643 6-11009A73 21 84426B48 665 pF ± 5%: 500 V 48-889842 NPN; type M9642 23.845386220 47 ± 20% 10 V 48.860570 NPN: type M9570 R134 thru 136 8-11009A77 C78. 79 48869534 NPN: type M9534 B-11009A84 47 pF ± 5% Q704 Q706 48-869534 NPN: type M9534 NPN: type M9570 047 ± 5% . 50 V 48-880570 R139 R140 C82 83 01 + 80-20% 6-11009A99 resistor, fixed: ±5%; 1/4 W: C85 86 C87 88 21 84494829 10 oF ± 5% 500 V unless otherwise stated R142 R143 6-11009A44 23-84538G29 47 ± 20° ± 10 V 6-11009A25 6-11009A87 R146 R147 R148 R149 R150 R151 .01 + 80-20% 21-11015A07 .01 + 80-20% B-11009A97 6-11009A59 R12 R13, 14 23-84538G29 47 ± 20% 10 \ 6-11009A81 6-11009A89 C94 95 .01 + 80-20% 8-11017801 R15 R16 R17 6-11009A55 01 + 80-20% 6-11009A61 6-11009A73 47 ± 20%, 20 V R152 23-84538G06 6-11009F01 21 82372C04 05 + 80-20% 25 V R19 R20, 21 6-11009A57 R154 R156 R156 8-11009E23 6-11009A49 01 + 80-20% 6-11009E71 .01 + 80-20% 6-11009E67 B23 6-11009F81 6-11009E18 22 pF ± 5%; 50 V 47 pF ± 5%; 50 V C705 R24 R25, 26 R158 R159 6-11009E73 21-83406D44 6-84376L15 9090 ± 0.5% (136-174 MHz) 6-11009E01 .01 + 80-20% 6-11009E37 6-11009E65 21-11015B09 R39 R40 R40A 6-11009A73 R161 R162 8-11009E58 21-11015A07 .01 + 80-20% 6-11009A89 6-11009E59 21-82610C09 62 pF ± 5%, 50 V R41 R42 thru 51 6-11009E73 R164, 165 6-11009E73 21-84493802 22 + 5% . 50 V D166 167 6-11000E71 47 OF + 58% 6-11009A39 6-11009E91 21-11014H41 21-83596E13 6-11009E59 R169, 170 6-11009E67 21-82610C44 100 pF ± 5% 50 V R54 R55 R56 R57 6-11009E49 D171 21-82610C03 21-11014H25 47 pF + 5%, 200 V 10 pF ± 0.5 pF 6-11009E25 B172 6-11009E72 6-11009E82 6-11009E81 6-11009A49 B174 18-84143N06 variable; 50k 16 pF ± 5%, 50 V R58 R59 R60, 61 R175, 176, 177 18-84143N01 C725 C726 21-83406D93 variable: 10k 62 pF ± 5% 50 V 21 83406D90 11 pF ± 5%, 50 V R208 6-11009E81 C727 C728, 730 C729 C731 C732, 733 C734 735 C737 47 pF ± 5% R82 6-11009A43 B209 6-11009E51 6-11009E73 21-11015A07 01 + 80-20% 21-11015B01 6-11009A73 6-11009A73 1 pF ± 0 25 pF, 50 V R66 R67, 68 R70, 71 6-11009A41 6-11009A89 21-11015A07 .01 + 80-20% 6-11009A73 R71A 6-11009A18 R700 R701 6-11009A57 R72 R73, 74 6-11009A95 6-11009E87 diode: (see note CR1.2 6-11009E97 R703 R704 48-83510F03 6-11009A29 48-83329G02 R76 R77 6-11009E99 6-11009E88 R710 6-11009A65 CR4 48-82178A01 germanium CR5 CR6. 7 48-83654H01 48-84616A04 6-11009E39 R712 6-11009A18 hot carrier R80 6-11009E73 **B713** 6-11009A29 6-11009A59 6-11009E77 6-11009A77 6-11009E34 light emitting diode: (see note) 6-11009A49 48-88245C06

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
B717	6-11009A59	2.7k
R718	6-11009E34	240
R719	6-11009E49	1k
R720	6-11009E34	240
R722	6-11009A49	1k
R723	6-11009A57	2.2k
R724, 725	6-11009A49	1k
8726	6-11009A61	3.3k
B727	6-11009A39	390
R728	6-11009A61	3.3k
R729	6-11009A73	10k
	6-11009A73	10K 510
R730		
R731	6-11009A77	15k
R732	6-11009A53	1.5k
R733	6-11009E47	820
R734	6-11009A09	22
R735	6-11009E85	33k
R736	6-11009A77	15k
M730	6-3 TUU9A77	TOK
		thermistor:
RT600	6-858402	1k @ 25°C
		Integrated circuit: (see note)
U1	51-84371K76	dual timer
U3 thru B	51-82884L38	presettable ~ N counter
U9	51-84561L04	quad 2-input NAND gate
U10	51-84561L15	dual "D" filp-flop
U11	51-83627M11	quad 2-input NAND gate
U12	51-82848M23	quad 2-input exclusive OR gate
U13	51-84561L15	dual "D" flip-flop
U14, 15	51-84561L10	decade counter
U16	51-84371K37	dual 4-line to 1-line multiplexer
U17	51-82609M79	quad 2 exclusive OR gate
U18	51-80291B02	14.4 oscillator
U19. 20	51-84561L85	1 + 12 counter
U21	51-83629M81	quad op amplifier
U22	51-83629M32	dual op amplifier
U23	51-82884L62	programmable timer
U601	51-84768F68	prescaler
U602	51-84768F63	programmable divider
U603	51-84768F59	sample and hold phase detector
U604		
	TRN5481A	ROM (Specify Customer Frequency)
U606	51-84371K74	quad comparator
U607	51-84371K94	quad 2-input OR gate
U809	51-83629M32	dual op amplifler
	non-	referenced items
	3-134212	SCREW, tapping, 4-40 × 5/16", 6 user
	9-84924E02	IC SOCKET; 16 pin
	9-84207B01	METERING PLUG: 7 pin
	26-84030N01	SHIELD, wall multiplier
	26-84031N01	SHIELD, wall binary modulator
	26-84032N01	SHIELD, component side loop filter
	26-84055N01	SHIELD, multi solder side multiplier
	26-84056N01	SHIELD, driver solder side divider
	26-84061N01	SHIELD, component side ref. amplifi-
	26-84062N01	SHIELD, component side ref, loop
	26-84063N01	SHIELD, component side binary mod
	26-84072N01	SHIELD, component side phase dete
	26-84093N01	SHIELD, solder side ampl.
	26-84094N01	SHIELD, solder side loop filter
	26-84095N01	SHIELD, solder side rf loop
	26-84248B02	SHIELD, can; 3 used
	42-84284B01	RETAINER: 6 used
	29-80014A01	CLIP, coaxial; 3 used
	30-83794C01	CABLE, coaxial; WHT



MOTOROLA INC.

Communications Sector

JUMPER AND CABLE CONNECTIONS

FOR TDN6869A/70A MODEMS

1. GENERAL

Before either of these modems can be used, certain jumpers within the modem must be placed in the proper position to ensure correct operation with the paging station.

2. JUMPER POSITIONING

Remove the housing from the modem and position the jumpers as follows:

Jumper	Position
Carrier Detect Level	- 30 dBm Level
Carrier Detect Delay	6 msec. Option
4-Wire/2-Wire Operation	4-Wire Only

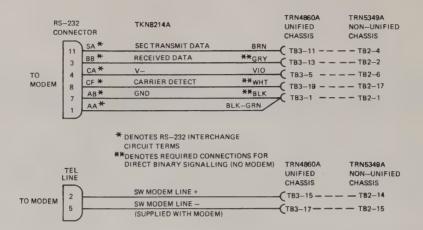
Reinstall the modem housing.

3. CABLE CONNECTIONS

Refer to schematic diagram PEPS-35122 for information on how to connect the two cables supplied.

4. MODEM OPERATION

The front panel rotary switch must be in the DATA position, and the rear panel power switch placed in the ON position for proper operation of the modem. Refer to the separately supplied modem instruction manual for further information.



BEPS-34993-A

parts list

TKN8214A Modem Cable			PL-8135-A
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
		connector, plug:	
	28-84506E01	male; 25-contact	
	me	echanical parts	
	14-84502E01	HOOD, contact	
	29-812979	LUG, crimp terminal; 4 used	
	29-84078B01	LUG, flanged spade	
	42-10217A02	STRAP, tie; 10 used	



WATTMETER OPTIONS

C47AD; 0-150 WATTS/25-1000 MHz C47AE; 0-400 WATTS/25-525 MHz

1. FUNCTIONAL DESCRIPTION

The C47AD/AE Wattmeter Options provide builtin metering of the transmitter forward and reverse power levels.

2. OPERATING INSTRUCTIONS

Select the desired power level and direction. Read the sampled power level from the meter. High power readings are 0-150 watts or 0-400 watts; Low power readings are 0-25 watts or 0-50 watts respectively. The meter functions are listed in the table shown in Figure 1.

NOTE

The meter should be in the OFF position when it is not in use. Do not select low power settings when measuring power levels greater than 25 watts. The power meter may falsely indicate high reflected power due to directivity in the wattmeter element.

3. RF POWER METER ADJUSTMENT

- Step 1. Key the station into a wattmeter and a 50-ohm load with rated station output power.
- Step 2. Set meter to FWD-HIGH position.
- Step 3. Adjust R1 until it agrees with the wattmeter reading.
- Step 4. Reverse the cable connections on the directional coupler.
- Step 5. Reduce the power on the station to low power for a full scale reading.
- Step 6. Put the meter switch in the REV-LOW position.
- Step 7. Adjust R7 on the power meter until it agrees with the wattmeter reading.

Step 8. Dekey the station and return all PA cables and the antenna.

4. DIRECTIONAL COUPLER KIT

4.1 FUNCTIONAL OPERATION

The directional coupler kit (wattmeter element) samples both forward and reflected power outputs of the final power amplifier. Two dc voltages are applied to the rf power meter and main interconnect board. The rf power meter uses these dc voltages to indicate forward and reflected rf power for the station. The dc voltages at the main interconnect board are routed to the optional alarm logic module. This module uses these voltages to indicate station status for possible alarm conditions.

4.2 MAINTENANCE AND TROUBLESHOOTING

The wattmeter element cannot be repaired since it contains hybrid circuitry. Consequently, the entire unit should be replaced if a fault is indicated by the following test procedure (refer to Figure 2).

- Step 1. Disconnect the antenna cable and connect a wattmeter and 50-ohm load to the antenna connector.
- Step 2. Key the station. RF power from final power amplifier passes through the wattmeter element to a wattmeter and a 50-ohm load. Verify the FWD-to-REF voltage (forward power) and the REV-to-REF voltage (reverse power) conform to those shown in Figure 3.

NOTE

The TTN6067A, 68A, 69A, & 70A Directional Coupler Kits are checked at 50 W input (50/100 W line on Figure 3). The TTN6071A, 72A, & 73A Directional Coupler Kits are checked at 100 W input (50/100 W line on Figure 3).

Step 3. Dekey the station and replace the wattmeter element if such readings cannot be obtained.

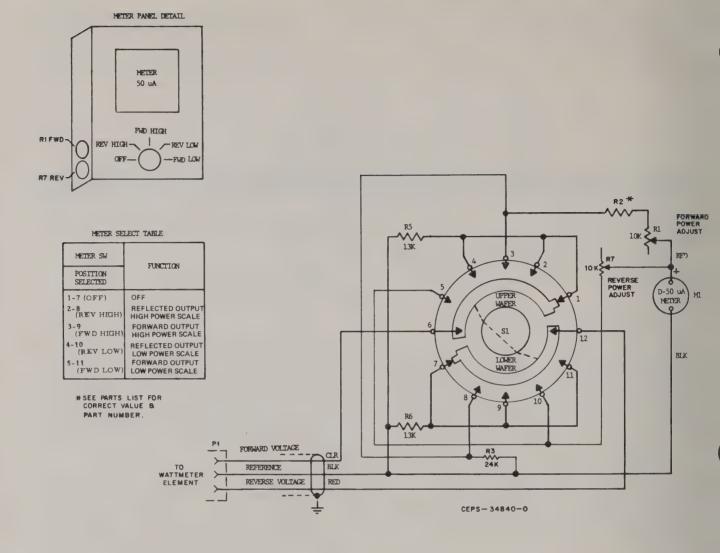


Figure 1. RF Power Meter Diagram, Meter Panel Detail & Meter Select Table

Step 4. Repeat the procedure to ascertain that the new element is in good working condition. Dekey the station.

NOTE

The wattmeter element may falsely generate a reflected power voltage due to directivity in the element. Meter accuracy is 10% of the high full-scale deflection.

Step 5. Reduce RF power to 15 to 25 watts. Repeat Steps 2 through 4.

Step 6. Dekey the station and reconnect all cables in their proper order.

Option Chart

C47AD

TTN6074A Wattmeter Kit 25-1000 MHz, 0-150 W

- *TTN6067A Directional Coupler Kit (25-100 MHz)
- *TTN6068A Directional Coupler Kit (100-225 MHz)
- *TTN6069A Directional Coupler Kit (225-525 MHz)
- *TTN6070A Directional Coupler Kit (525-1000 MHz)

C47AE

TTN6075A Wattmeter Kit 25-525 MHz, 0-400 W

- *TTN6071A Directional Coupler Kit (25-100 MHz)
- *TTN6072A Directional Coupler Kit (100-225 MHz)
- *TTN6073A Directional Coupler Kit (225-525 MHz)
- * Denotes frequency sensitive component, only one kit is used in each wattmeter kit.

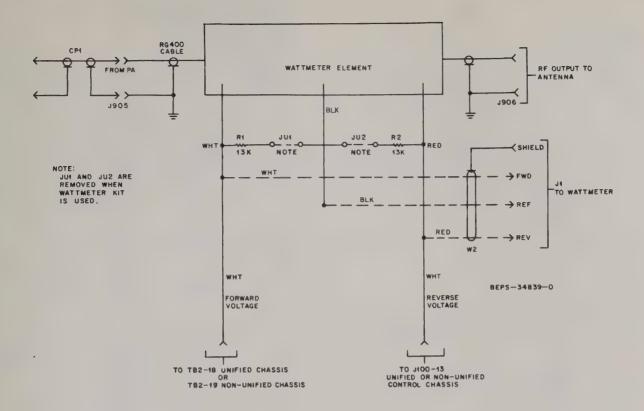


Figure 2. Directional Coupler Kit Diagram

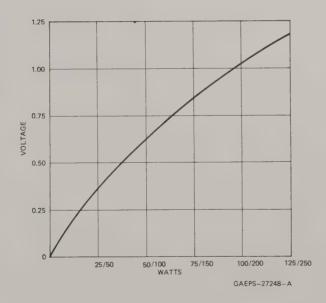


Figure 3. Wattmeter Element Voltage-vs-Power Curve

parts list

TTN6074A Wattmeter (0-150 Watt)

TTN6075A Wattmeter (0-400 Watt)			PL-8080-0
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
		meter:	
M1	72-84864B15	0-150 W; 50 uA (TTN6074A)	
	or 72-84864B05	0-400 W; 50 uA (TTN6075A)	
		connector, plug:	
P1	-	consists of:	
	15-84860K01	HOUSING, connector; 4-position	
	29-84706E06	TERMINAL, female; 3 used	
		resistor, fixed: ±5%; 1/4 W:	
		unless otherwise stated	
R1	18-82515B41	var. 10k	
R2	6-11009C79	18k (TTN6074A)	
	or 6-11009C81	22k (TTN6075A)	
R3	6-11009C82	24k	
R4		NOT USED	
R5,6	6-11009C76	13k	
R7	18-82515B41	var. 10k ± 20%	
		switch, rotary:	
S1	40-82560H02	2-pole, 5-position	
		cable:	
W1	30-84487C01	3-conductor; 41" used	
	non-	referenced items	
	2-7018	NUT, hex: 3/8-32 x 1/2 x 3/32"; 3 used	d
	2-82360B26	NUT, speed; 2 used (TTN6073A)	
	3-135038	SCREW, tapping: 14-14 x 3/4";	2 used
	4-7698	(TTN6073A)	
		WASHER, lock #3/8 int.	
	7-84001N01 29-82578C01	BRACKET, wattmeter	
	31-490142	LUG, ring tongue; 2 used TERMINAL STRIP	
	36-82869K01	KNOB	
	42-76724	CLIP, cable	
	3-139564	SCREW, captive: 3/8-24 x 1/2"; 2 use	ad
	0.100004	(TTN6067,68,69,70A)	su .
	4-7668	WASHER, lock 3/8 ext; 2 used	
		(TTN6067,68,69,70A)	

Directional Coupler Kit TTN6067A 0-150 Watt, 25-100 MHz TTN6068A 0-150 Watt, 100-225 MHz TTN6069A 0-150 Watt, 225-525 MHz TTN6070A 0-150 Watt, 525-1000 MHz TTN6071A 0-400 Watt, 25-100 MHz TTN6072A 0-400 Watt, 100-225 MHz

PL-8081-0

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		coupler, adapter:
CP1	1-80758D35	25-100 MHz (TTN6067A, 6068A, 6071A,
		6072A)
	28-48250	includes:
	28-84579F04	PLUG, adapter; right angle PLUG, coaxial; 2 used
	30-84173E01	CABLE, coaxial; 13 used
	or	OABLE, COAXIAI, TO USEC
	1-80758D36	225-525 MHz (TTN6069A)
		includes:
	28-82398E02	PLUG, right angle; 2 used
	30-84173E01	CABLE, coaxial; 15 used
	or	
	1-80788D29	225-1000 MHz (TTN6070A, 6073A)
		includes:
	28-852527	PLUG
	28-82398E02	PLUG, right angle
	30-84173E01	CABLE, coaxial; 11 used
		connector, receptacle:
J1 .		consists of:
	15-84861K01	HOUSING, connector; 4-position
	29-84706E05	TERMINAL, male; 3 used
J905,906	-	p/o wattmeter element
		resistor, fixed:
R1,2	6-11009C76	13k ±5%; 1/4 W
		referenced items
	1-80758D34	BRACKET, directional coupler: riveted
	58-84918L05	WATTMETER ELEMENT; 25-100 MHz
	E0.040401.07	(TTN6067A)
	58-84918L07	WATTMETER ELEMENT; 100-225 MHz
	58-84918L09	(TTN6068A) WATTMETER ELEMENT; 225-525 MHz
	30-049 TOLUS	(TTN6069A)
	58-84918L04	WATTMETER ELEMENT; 525-1000 MHz
	00 040 10204	(TTN6070A)
	58-84918L06	WATTMETER ELEMENT; 25-100 MHz
		(TTN6071A)
	58-84918L08	WATTMETER ELEMENT; 100-225 MHz
		(TTN6072A)
	58-84918L10	WATTMETER ELEMENT; 225-525 MHz
		(TTN6073A)
	2-82360B26	NUT, speed; 2 used (TTN6071A, 6073A)
	2-82360B34	NUT, speed; 2 used (TTN6072A)
	3-135038	SCREW, tapping: 14-14 x 3/4"; 2 used
	0.400004	(TTN6071A, 6072A, 6073A)
		SCREW, tapping: 4-40 x 5/16"; 2 used
	3-136924	COREW
	3-139564	SCREW, captive: 3/8-24 x 1/2"; 2 used
	3-139564	(TTN6067A, 6068A, 6069A, 6070A)
		(TTN6067A, 6068A, 6069A, 6070A) WASHER, lock: #3/8 ext; 2 used (TTN6067A,
	3-139564 4-7668	(TTN6067A, 6068A, 6069A, 6070A) WASHER, lock: #3/8 ext; 2 used (TTN6067A, 6068A, 6069A, 6070A)
	3-139564 4-7668 29-812979	(TTN6067A, 6068A, 6069A, 6070A) WASHER, lock: #3/8 ext; 2 used (TTN6067A, 6068A, 6069A, 6070A) LUG, crimp terminal
	3-139564 4-7668	(TTN6067A, 6068A, 6069A, 6070A) WASHER, lock: #3/8 ext; 2 used (TTN6067A, 6068A, 6069A, 6070A)



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To the User of This Instruction Manual:

Motorola is engaged in a continuous program of improving its instruction literature. We believe that you can aid us in this program, so that we in turn can better help you service our equipment. To foster these aims, would you please answer the following questions:

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Five reference publications are available to provide background information needed to service some of the newer Motorola products more effectively. The information in these publications is not duplicated in our instruction manuals. To obtain your free copy, check the ones you want and return this self-mailer to us. (NOTE: One copy of each publication has already been distributed to Motorola Service Shops (MSS's) and field technical representatives (FTR's).

Check item desired:	
Basic Logic Circuit Guide Describes the basic logic circuits used in Motorola Communications digital equipment and the logic notational scheme used in our instruction manuals.	68P81105E88
"Digital Private-Line" Binary-Coded Squelch Contains fundamentals of "Digital Private- Line" system operation, circuit operation and servicing techniques.	68P81106E83
Safe Handling of CMOS Integrated Circuit Devices Describes special handling techniques needed to prevent irrepairable damage from static charges encountered with nor- mal handling of CMOS devices.	68P81106E84
Reducing Noise Interference in Mobile Two- Way Radio Installations Defines the major sources of noise encountered in a mobile radio installation and suggests methods of remedying them.	68P81109E33
Anti-Skid Braking Precautions Provides installation suggestions and a detailed checkout procedure for installation of mobile radios in vehicles with anti-skid braking systems.	68P81109E34
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instruction manual revision

GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

INSTRUCTION MANUAL AFFECTED:

68P81062E70-0

PURC Radio Paging Stations 928-960 MHz Transmit

REVISION DETAILS:

1. Change the cover page to read as follows:

PURC™
Radio Paging Station
928-960 MHz Transmit
125 Watts
110 W (Frequency Spacing of
1.5 to 2.25 MHz)

2. The TLN2675A (2-Frequency) and TLN2703A (3-Frequency) Multifrequency Control Modules are new units that have been added to the PURC station. Add the attached information to your PURC manual immediately following the Antenna Changeover Relay instruction section (PEPS-33548) behind the RECEIVER tab.

ATTACHMENTS:





MULTIFREQUENCY CONTROL MODULE

MODELS TLN2675A (2 FREQUENCY) TLN2703A (3 FREQUENCY)

1. GENERAL DESCRIPTION

- 1.1 Multifrequency Control Modules TLN2675A (2 Frequency) and TLN2703A (3 Frequency) control the operating frequency of *PURC* Radio Paging Stations by selecting one of two or three paging synthesizers which are a part of the paging station. Motorola model number C75JZB1111A is a 2- frequency *PURC* radio paging station and model number C75JZB1131A is a 3- frequency system.
- 1.2 The multifrequency control modules mount in standard 19-inch racks as shown in Figure 1. Table 1 shows the model complement for the multifrequency control modules. Interconnecting cabling data is given in PEPS-38154.

Table 1. Model Complement

Model	Description
TLN2675A	Multifrequency Control Module
	(2 Frequency)
TCN6264A	Control Board (2 Frequency)
TKN8989A	Cable Barrier Strip
TRN9039A	Chassis Hardware (2 Frequency)
TLN2703A	Multifrequency Control Module
	(3 Frequency)
TCN6265A	Control Board (3 Frequency)
- TKN8989A	Cable Barrier Strip
TRN9127A	Chassis Hardware (3 Frequency)

- 1.3 RF is applied from two or three synthesizers to an rf switching network. Two frequency select signals from the simulcast control module, in conjunction with OUT-OF-LOCK INDICATE signals from the synthesizers, select which synthesizer is used. The selected synthesizer rf is applied to the exciter. The non-selected rf is attenuated by a PIN diode network.
- 1.4 Audio is routed from the exciter to the synthesizers. DEVIATION ADJUST potentiometers adjust the maximum deviation of each synthesizer.

2. THEORY OF OPERATION

(Refer to PEPS-38154 for schematic diagram details.)

The following description assumes a 3-frequency paging station. For a 2-frequency paging station, disregard all F3 or synthesizer 3 circuitry.

- 2.1 FREQUENCY SELECT AND RF SWITCHING CIRCUITRY
- 2.1.1 F1 SELECT (SYN 0) and F2 SELECT (SYN 1) from the simulcast control module enter at TB1-8 and TB1-9, respectively. These inputs are applied to logic network U4A, U6C, U2C, U2A, U6A, U2D, U3B, U6B, and U2B. In accordance with the truth table shown in Table 2, the output of U7B, U7C, or U7D goes high. This high turns on Q3, Q4, or Q5 causing the RF ENABLE to go low and turn on the selected synthesizer. (This condition assumes that the synthesizer is not out-of-lock as described in paragraph 2.2.)

Table 2. Synthesizer Select Truth Table

F1 Select (SYN 0) F2 Select (SYN 1)	Synthesizer Selected
1、常為的數學學學學學學	None (Station unkeyed.)
0 1 38	1 (U7B high)
1.373.77070.00	2 (U7C high)
	3 (U7D high)

- 2.1.2 The high from U7B, U7C, or U7D is also applied to rf switching PIN diode network CR2, CR3, CR5, CR6, CR8, and CR9 to select the desired synthesizer rf which is applied to the exciter via J4. The non-selected rf is attenuated by the PIN diode network. The PIN diode network provides an attenuation of 60 dB minimum. (Measured at 14 MHz with the output terminated into a 50 ohm spectrum analyzer and an input impedance of 50 ohms.)
- 2.1.3 The high from U7B, U7C, or U7D is also applied to Q6, Q7, or Q8 to turn on channel indicator LED DS1, DS2, or DS3.

2.1.4 Manual Select switch S1 is normally set to F1 which allows the frequency select circuitry to operate as described above. During servicing, any one of the three synthesizers can be selected by setting S1 to F1, F2, or F3 and by keying locally. When F2 or F3 are selected, DS4 flashes red on the front of the chassis to indicate that the unit is in a LOCAL F2 or LOCAL F3 servicing mode. Timer U1 determines the flashing rate of DS4.

2.2 OUT-OF-LOCK INDICATE CIRCUITRY

- 2.2.1 OUT-OF-LOCK INDICATE signals from the three synthesizers enter at TB1-2, TB1-3, and TB1-4. If any of the OUT-OF-LOCK INDICATE signals go low and the respective frequency is selected, Q1 turns on and the TRANSMIT INHIBIT at TB1-13 goes low to inhibit the transmitter.
- 2.2.2 Any low OUT-OF-LOCK INDICATE signal also turns on Q2 and relay K1 to provide a RELAY output which can be used to activate an out-of-lock alarm as desired.
- 2.2.3 Any low OUT-OF-LOCK INDICATE signal also turns off Q3, Q4, or Q5 (depending on which synthesizer is out-of-lock). This causes the RF ENABLE to go high and disable the respective synthesizer.

2.3 AUDIO CIRCUITRY

J5 receives audio from the exciter and applies the audio to DEVIATION ADJUST potentiometers R19, R20, and R21. The DEVIATION ADJUST potentiometers set the maximum deviation level of the audio applied to the synthesizers.

3. MULTIFREQUENCY TRANSMITTER ALIGNMENT

3.1 SYNTHESIZERS

Align each synthesizer per Paging Synthesizer instruction section 68P81062E72 PURC Radio Paging Stations Control and Application Manual 68P81060E70.

3.2 EXCITER

Align the exciter per instructions in Exciter instruction section 68P81063E18 in manual 68P81062E70 at the lowest transmitter frequency.

3.3 INTERMEDIATE POWER AMPLIFIER (IPA)

Align the IPA per instructions in IPA instruction section 68P81063E21 of manual 68P81062E70 at the lowest transmitter frequency.

3.4 FINAL POWER AMPLIFIER (FPA)

Align the FPA per instructions in FPA instruction section 68P81063E24 of manual 68P81062E70 at the lowest transmitter frequency. Then perform athe following procedure.

3.4.1 Multifrequency PA Tuning

- Step 1. Note the power output level at the lowest frequency.
- Step 2. Select the highest frequency and note the loss in power output level from Step 1.
- Step 3. Turn the output tuning knob inward until 1/2 the loss noted in Step 2 is recovered.
- Step 4. Select the lowest frequency and note any change in output power from Step 3.
- Step 5. Turn the output tuning knob until 1/2 the loss in output power noted in Step 4 is recovered.
- Step 6. Repeat Steps 1 through 5 until the difference in the power between the highest and lowest power is 2 watts or less.
- Step 7. If there is a mid-frequency, select it. If output power is greater than 125 watts, reduce plate current to achieve 125 watts.
- Step 8. Tighten down the output coupling and tuning controls. Tighten the input coupling shaft and tuning control.

3.4.2 Power Degradation for Multifrequency Stations

Adjust plate current control to achieve output power levels per table below.

Frequency Spacing	Radio Power Output
0 to 1-1/2 MHz	125 Watts
1-1/2 to 2-1/4 MHz	110 Watts

4. **DEVIATION SETTING**

To set maximum deviation, proceed as follows.

- Step 1. Turn the exciter IDC control (R410) fully clockwise.
- Step 2. Adjust the DEVIATION ADJUST controls, accessible through the front of the multifrequency control chassis, for ± 5 kHz deviation. Do this for each frequency as shown below.

Frequency	Deviation Adjust (IDC) Control
F1	R19
F2	R20
F3	R21

5. JUMPER INFORMATION

5.1 MULTIFREQUENCY CONTROL MODULE TLN2675A AND TLN2703A

Jumpers are wired for either 2-frequency (TLN2675A) or 3-frequency (TLN2703A) operation as follows:

Jumper (1996)	2-Frequency	3-Frequency
JUI A STATE	OUT	OUT
JU2	IN Section	IN
JU3 (3) (4)	OUT	Mary IN

5.2 SIMULCAST CONTROL MODULE TLN2559B

JU2 is IN for single frequency operation and OUT for multifrequency operations.

5.3 STATION CONTROL MODULE TRN4854B

JU4 is IN for multifrequency operation. JU4 is OUT for single frequency operation when using a TLN2559B Simulcast Control Module. JU4 is IN for single frequency operation when using a TLN2559A Simulcast Control Module.

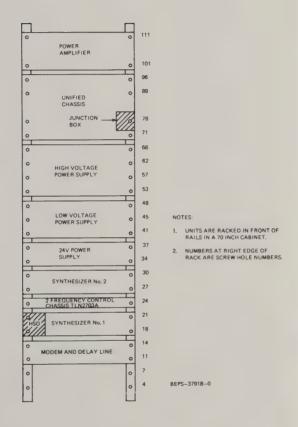


RE RACKED IN FRONT OF A 70 INCH CABINET.

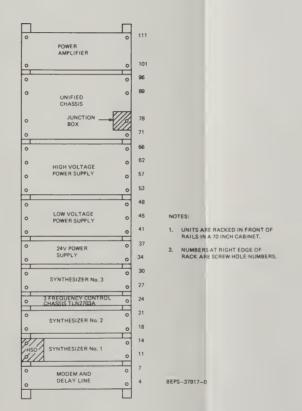
S AT RIGHT EDGE OF E SCREW HOLE NUMBERS.

Figure 1. PURC Radio Paging Station Rack Layout





2 FREQUENCY LAYOUT



3 FREQUENCY LAYOUT



MULTIFREQUENCY CONTROL MODULE

MODELS TLN2675A (2 FREQUENCY) TLN2703A (3 FREQUENCY)

NTERCONNECTING

PART NUMBERS FOR THE IN S AS FOLLOWS.

PART NO.

1-80759D83 1-80759D84 1-80778D97 1-80778D99

NOT USED 1-80779 DOI P/O 1-80778 D98 ASSIS

OC

CONTROL CHA

F1 F2 RELAY A+ INH

REAR VIE

DEVIATION ADJUST F1 F2 F3

FRONT VIEW

-- AUDIO -- RF----

1 2 3 XCTR 1 2 3 XCTR

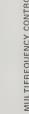
NORMAL FI

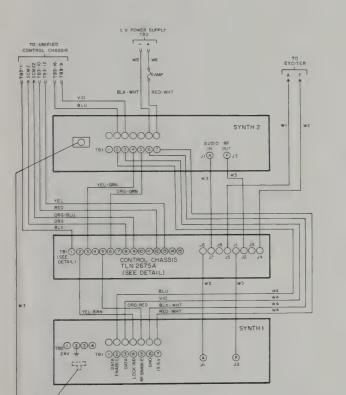
LOCAL F2 O LOCAL F3



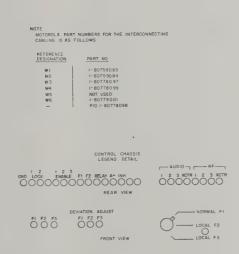
MULTIFREQUENCY CONTROL MODULE MODELS TLN2675A (2 FREQUENCY)

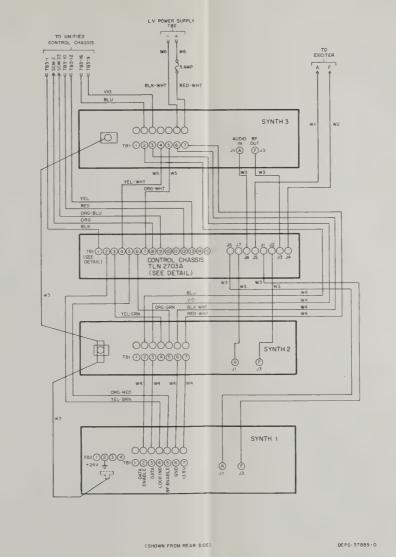
TLN2703A (3 FREQUENCY)

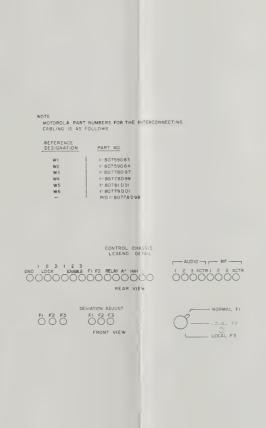




(SHOWN FROM REAR SIDE)







2-FREQUENCY INTERCONNECTING CABLING

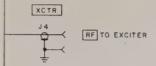
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Motorola No. PEPS-38154-O (Sheet 1 of 3) 11/11/83- PHI

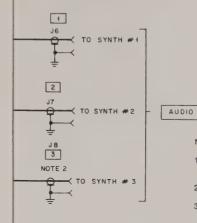
TCN6265A Contro	Board (3-Frequer	ncy) PL-8688-O
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
0.111000		capacitor, fixed; uF:
C1 thru 5	21-11015A07	.01 + 80 - 20%
C6 C7, 8	21-11015A07	NOT USED .01 + 80 - 20%
C9		NOTUSED
C10 C11	23-84538G06 23-84538G04	47 ± 20%; 20 V 15 ± 20%; 20 V
C12	21-11015A07	.01 + 80 - 20%
		diode: (see note)
CR1		NOTUSED
CR2, 3	48-83510F03	silicon NOT USED
CR4 CR5, 6	48-83510F03	silicon
CR7	40.00540500	NOTUSED
CR8, 9 CR10, 11	48-83510F03 48-83654H01	slicon silicon
CR12	48-82466H13	silicon
		light emitting diode: (see note)
DS1 thru 3	48-88245C29	green
DS4	48-88245C28	red
		connector:
J1 thru 8	29-80014A01	TERMINAL, coaxial cable
		relay:
K1	80-82617M11	1 form "C"; coil res. 800
		coil, rf:
L1 thru 5	24-82135G10	choke; 100 uH
		connector, plug:
P1	28-83143M03	male; 14-contact
		transistor: (see note)
Q1 thru 8	48-869642	NPN: type M9642
		resistor, fixed ±; 1/4 W:
		unless otherwise stated
R1, 2	0.44000040	NOT USED .
R3, 4 R5, 6	6-11009C49 6-11009C43	1k 560
R7,8		NOTUSED
R9, 10 R11 thru 14	6-11009C49	1k NOT USED
R15, 16	6-11009C49	1k
R17, 18 R19, 20, 21	18-83452F19	NOT USED variable; 100k
R22	6-125B70	1; 1/2 W
R23 R24	6-11009C65 6-11009C69	4.7k 6.8k
R25	6-11009C81	22k
R26	6-11009C65	4.7k 820
R27 R28	6-11009C47 6-11009C49	1k
R29	6-11009C47	820
R30	6-11009C49 6-11009C47	1k 820
R32	6-11009C49	1k
R33 R34 thru 38	6-11009C47 6-11009C65	820 4.7k
R39, 40, 41	6-11009C61	3.3k
R42 R43	6-11009C49 6-11009C37	1k 330
R44	6-11009C37	1k
R45	6-11009C37	330 4.7k
R46 R47, 48	6-11009C65 6-11009C49	4.7K 1k
R49, 50, 51	6-11009C73	10k
		switch:
S1	40-83658N01	rotary; 5 position
		integrated circuit: (see note)
U1	51-84561L23	timer
U2, 3 U4	51-82884L04 51-82884L17	quad 2-input NOR gate triple 3-input NOR gate
U5, 6	51-82884L02	hex non-inverting buffer
U7	51-83629M08	quad operational amplifier
		echanical parts
	3-138162 42-84284B01	SCREW, tapping: 4-40 × 3/8"; 6 used RETAINER; 6 used
	1-80778D92	CABLE Assembly, short; 2 used TCN6264A,
	9-84968D01	3 used TCN6265A; includes: CONNECTOR, female; single contact
	30-83794C01	CABLE, coaxial (WHT) 6"
	1-80778D93	CABLE Assembly, long; 4 used TCN6264A,
	9-84968D01	5 used TCN6265A; includes: CONNECTOR, female; single contact
	30-83794C01	CABLE, coaxial (WHT); 8-1/2"

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

MULTIFREQUENCY CONTROL MODULE



MODELS TLN2675A (2 FREQUENCY) TLN2703A (3 FREQUENCY)



NOTES:

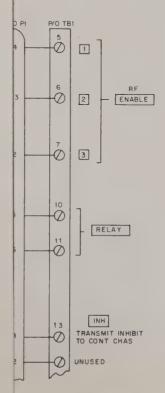
- Unless otherwise specified, all resistors are in ohms; all capacitors are in microfarads; and all inductors are in microhenries.
- 2. J3 and J8 are installed in TCN6265A Models only.
- DS4 flashes when S1 selects LOCAL F2 or LOCAL F3. DS4 is off when S1 selects normal F1.
- 4. Integrated circuit connections for this board are as follows:



Reference Designation	Mfgr's Description	A+	GNE
U1	Timer	8	1
U2, U3	Quad 2-Input NOR Gate	14	7
U4	Triple 3-Input NOR Gate	14	7
U5, U6	Hex Inverter Buffer	1	8
U7	Quad Op Amp	4	11

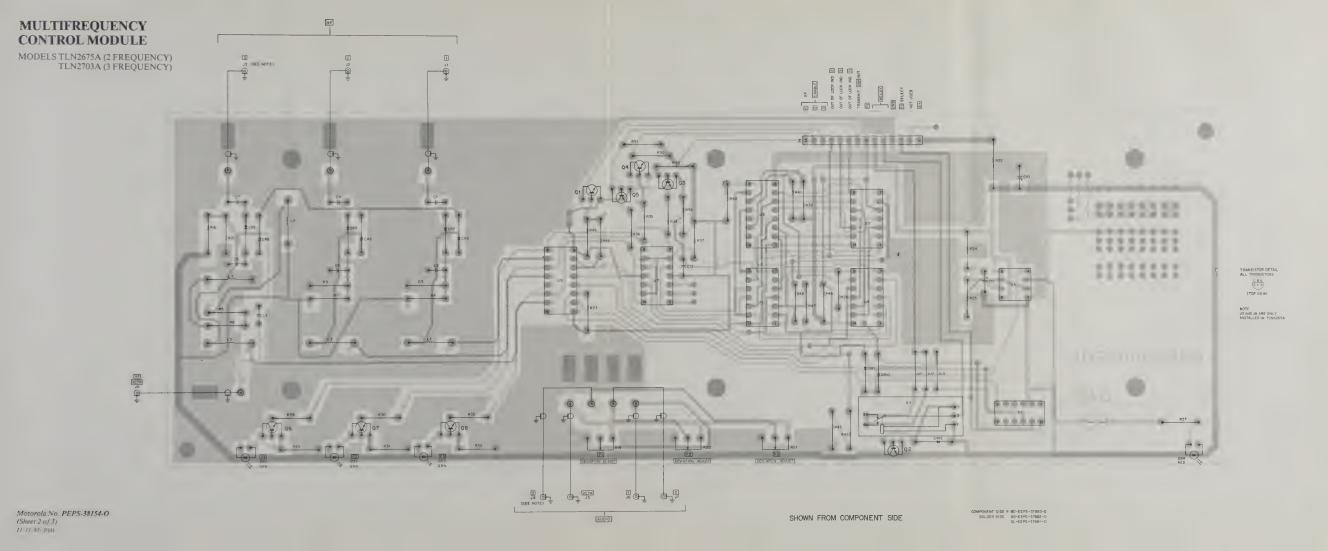
5. Jumpers are wired for either 2-frequency or 3-frequency operation as follows:

Jumper	2-Frequency	3-Frequency
JU1	OUT	OUT
JU2	IN	IN
JU3	OUT	IN



Motorola No. PEPS-38154-O (Sheet 3 of 3) 11/11/83- PHI

EEPS-37880-0



parts list

REFERENCE	MOTOROLA	ncy) PL-8688-0
SYMBOL	PART NO.	DESCRIPTION
C1 thru 5 C6	21-11015A07	capacitor, fixed; uF .01 + 80 - 20% NOT USED
C6 C7.8 C9	21-11015A07	01 + 80 - 20% NOT USED
C9	23-84538G06	NOT USED 47 ± 20% 20 V
C10 C11	23-84538G04	47 ± 20%, 20 V 15 ± 20%, 20 V
C12	21-11015A07	.01 + 80 - 20%
CR1		diode: (see note) NOT USED
CR2.3	48-83510F03	silicon
CR4 CR5, 6	48-83510F03	NOT USED silicon
CR7		NOTUSED
CR8, 9 CR10, 11	48-83510F03 48-83654H01	silicon silicon
CR12	48-82466H13	silicon
		light emitting diode (see note)
DS1 thru 3	48-88245C29	green
DS4	48-88245C28	red
		connector
J1 thru 8	29-80014A01	TERMINAL, coaxial cable
K1	80-82617M11	relay 1 form "C", coll res 800
L1 thru 5	24-82135G10	coil, rf: choke, 100 uH
		connector, plug
P1	28-83143M03	male; 14-contact
		transistor (see note)
O1 thru 8	48-869642	NPN: type M9642
		resistor, fixed ±: 1/4 W
R1,2		unless otherwise stated NOT USED
R3, 4	6-11009C49	1k
R5, 6 R7, 8	6-11009C43	560 NOTUSED
R9, 10 R11 thru 14	6-11009C49	1k
R11 thru 14	6-11009C49	NOTUSED
R15, 16 R17, 18	6-11009C49	1k NOTUSED
	18-83452F19	variable 100k
R22	6-125B70	1, 1/2 W 4.7k
R23 R24	6-11009C65 6-11009C69	4.7k 6.8k
R25	6-11009C81	22k
R26 R27	6-11009C65 6-11009C47	4.7k
R28	6-11009C47 6-11009C49	820 1k
R29	6-11009C47	820
R30	6-11009C49	1k
R31 R32	6-11009C47 6-11009C49	820 1k
FI33	6-11009C47	820
R34 thru 38	6-11009C65	4.7k
R39 40, 41 R42	6-11009C61 6-11009C49	3.3k 1k
R43	6-11009C37	330
R44 R45	6-11009C49 6-11009C37	1k 330
R46	6-11009C37 6-11009C65	330 4.7k
R47, 48	6-11009C49	1k
R49, 50, 51	6-11009C73	10k
\$1	40-83658N01	switch. rotary, 5 position
บา	51-84561L23	integrated circuit. (see note) timer
U2.3	51-82884L04 51-82884L17	quad 2-input NOR gate triple 3-input NOR gate
U5. 6	51-82884L02	hex non-inverting buffer
U7	51-83629M08	quad operational amplifier
		echanical parts
	3-138162 42-84284B01	SCREW, tapping, 4-40 × 3/8", 6 used RETAINER; 6 used
	1-80778D92	CARLE Assembly short: 2 used TCN62644
	9-84968D01	3 used TCN6265A includes CONNECTOR, female, single contact
	30-83794C01	
	1-80778D93	CABLE Assembly, long, 4 used TCN6264A, 5 used TCN6265A, includes CONNECTOR, female, single contact
	9-84968D01	b used i CN6265A, includes

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motoroia part numbers

parts list

TKN8955A Assembly Cable (2-Frequency) TKN8999A Assembly Cable (3-Frequency) PL-8778-O REFERENCE MOTOROLA SYMBOL PART NO DESCRIPTION 1-80759D83 AUDIO CABLE Assembly, includes CONNECTOR, male single contact, CABLE, coaxial (WHT), 60" used SLEEVING coded "A", 2 used 30-83794C01 37-82603D88 RF CABLE Assembly, includes 28-83099K01 CONNECTOR, male single contact, CABLE coaxial (WHT), 60" used 1 80778097 CABLE (12") Assembly, includes 28-83099K01 CONNECTOR, male single contact, 30-83794C01 CABLE, coaxial (WHT), 12" used 1 80778099 CABLE Assembly interconnect; includes LUG, crimp terminal, 8 used STRAP,tie 091 x 3.62" (WHT), 5 used 29-812979 CABLE Assembly interconnect, 3-Freq., lug, crimp terminal, 4 used STRAP, tie 091 × 3.62" (WHT), 4 used 1-80779D01 CABLE Assembly, fused; includes: 14-82882A01 BODY fuseholder CAP, fuseholder 29-812979 LUG, crimp terminal; 4 used STRAP, tie 091 × 3 62" (WHT), 4 used 42-10217A02 CLIP, fuse, 2 used FUSE, 5 amp, 250 V 1-803/19098 CABLE Assembly, control; includes:
9-83/19402 RECEPTACLE, crimp, 2 used LUG, crimp terminal, 20 used 37 82603D60 SLEEVING, coded blank, 2 used 42 10217A02 STRAP, tie 091 x 3.62" (WHT), 20 used

SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	2-82360B34	NUT, speed 1/4-14, 6 used
	3-135038	SCREW, tapping 14-14 x 3/4", 6 used
	9-82578801	CONNECTOR. "T"
	47-82977P01	ROD, slide synthesizer, 2 used
	54-83261P01	LABEL channel and frequency

REFERENCE	MOTOROLA PART NO.	DESCRIPTION
	1-80781030	MODEM CABLE Assembly 80" (TKN8998A
	14-84520E01	HOOD, connector
	28-84506E01	CONNECTOR, male: 25 contact
	29-812979	LUG, crimp terminal; 4 used
	29-84078801	LUG, flanged spade
	42-10217A02	STRAP, tie: .091 x 3.62" (WHT): 11 used
	1-80742D35	MODEM CABLE Assembly (TKN8214A)
		includes
	14-84502E01	HOOD, connector
	28-84506E01	CONNECTOR, male: 25-contact
	29-812979	LUG, crimp terminal; 4 used
	29-84078801	LUG, flanged spade
	42-10217A02	STRAP, (ie: .091 x 3.62 (WHT); 10 used

TRN5980A Hardw	are Multifrequency	PL-87	1-8777-0	
REFERENCE	MOTOROLA PART NO.	DESCRIPTION		
	3-138162	SCREW, tapping: 4-40 × 3/8"; 2 used		
	42-84284B01	RETAINER: 2 used		
	75-82303N04	PAD, rubber		
	5-84500B03	EYELET, special; 2 used		
	15-83537N02	COVER, channel element		
	1-80769D84	EXCITER CABLE Assembly includes:		
	9-83208C02	SOCKET		
	9-84968D01	CONNECTOR, female: single contact		
		(BNC), 2 used		
	26-82254P01	SHIELD oscillator		
	30-83794C01	CABLE, coaxial (WHT); 18" used		
	37 109120	GROMMET, rubber		
	37 82603088	SLEEVING, coded "A"		
	37-82603D93	SLEEVING, coded "F"		
	2 82360834	NUT, speed: 1/4-14", 18 used		
	3-135038	SCREW, tapping: 14-14 x 3/4"; 18 used		
	7-84172N02	BRACKET, rack		
	9-82578801	CONNECTOR, "T"		
	42-10217A10	STRAP, tie 0 184 x 7.78": 4 used		
	47-82977P01	ROD, slide synthesizer, 2 used		
	54.83261P01	1 ABEL channel and frequency		

REFERENCE	MOTOROLA	
SYMBOL	PART NO.	DESCRIPTION
	3-129997	SCREW, machine: 4-40 x 5/16": 3 used
	3-136850	SCREW, tapping: 6-32 x 1/2": 4 used
	27-82978P01	CHASSIS
	36-83656P01	KNOB, control
	42-84284P01	RETAINER; 3 used -
	15-82979P01	COVER
	38-010388	BUTTON, plug; 2 used (TRN9039A only)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
P1	15-83142M03	connector, receptacle:
-1	13-03142MU3	HOUSING, 14-contact
		terminal board:
TB1	31-824738	15 terminals
	m	achanical parts
	39-82717M01	CONTACT, receptacle: 13 used
	42-10217A02	STRAP, tie: .091 x 3.62 (WHT): 6 used

TKN8989A Cable Barrier Strlp PL-8690-O



M9642

NOTE 4 . U

M9642

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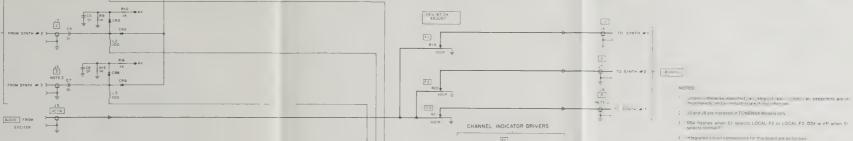
OUT-OF- CRIZE

R43 330 = M9642 TRANSMIT

INHIBIT SWITCH

LOCK RELAY DRIVER

MODELS TLN2675A (2 FREQUENCY) TLN2703A (3 FREQUENCY)



R5 L5

RF SWITCHING NETWORK

FROM SYNTH # (> 0)|

FI SELECT FI

INDICATE

LOCK - OUT OF LOCK 2

F2 SELECT F2 F OUT OF LOCK [1]

OUT OF LOCK 3



Reference Designation	Mfgr's Description	A+	GI
UT	Timer	8	
U2 U3	Quad 2 Input NOR Gate	14	
U4	Triple 3-Input NOR Gate	14	
U5. U6	Hex Inverter Buffer	1	8
U?	Sunt (Art)		

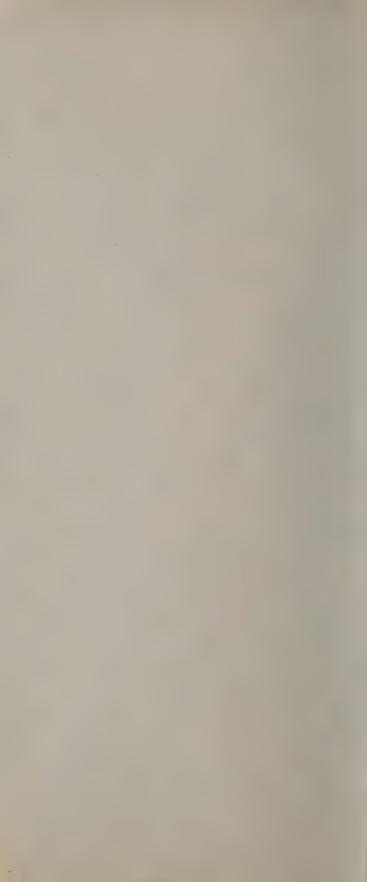
pers are wired for e	die tegen trage	e" , sett of the same
Jumper	2-Frequency	3.Frequency
		3.1

Motorola No. PEPS-38154-0

11/11/83-PHI









instruction manual revision

GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

INSTRUCTION MANUAL AFFECTED:

68P81062E70-0

PURC Radio Paging Stations 928-960 MHz Transmit

REVISION DETAILS:

1. Change the cover page to read as follows:

PURC™
Radio Paging Station
928-960 MHz Transmit
125 Watts
110 W (Frequency Spacing of
1.5 to 2.25 MHz)

2. The TLN2675A (2-Frequency) and TLN2703A (3-Frequency) Multifrequency Control Modules are new units that have been added to the *PURC* station. Add the attached information to your *PURC* manual immediately following the Antenna Changeover Relay instruction section (PEPS-33548) behind the RECEIVER tab.

ATTACHMENTS:





Sector

MULTIFREQUENCY CONTROL MODULE

MODELS TLN2675A (2 FREQUENCY) TLN2703A (3 FREQUENCY)

1. GENERAL DESCRIPTION

- Multifrequency Control Modules TLN2675A (2 Frequency) and TLN2703A (3 Frequency) control the operating frequency of PURC Radio Paging Stations by selecting one of two or three paging synthesizers which are a part of the paging station. Motorola model number C75JZB1111A is a 2- frequency PURC radio paging station and model number C75-JZB1131A is a 3-frequency system.
- The multifrequency control modules mount in standard 19-inch racks as shown in Figure 1. Table 1 shows the model complement for the multifrequency control modules. Interconnecting cabling data is given in PEPS-38154.

Table 1. Model Complement

Model		Description	
TLN2675A		Multifrequency Control Module (2 Frequency)	
TCN6264A		Control Board (2 Frequency)	
TKN8989A		Cable Barrier Strip	
TRN9039A		Chassis Hardware (2 Frequency)	
TLN2703A		Multifrequency Control Module	
		(3 Frequency)	
TCN6265A		Control Board (3 Frequency)	
TKN8989A		Cable Barrier Strip	
TRN9127A		Chassis Hardware (3 Frequency)	

- 1.3 RF is applied from two or three synthesizers to an rf switching network. Two frequency select signals from the simulcast control module, in conjunction with OUT-OF-LOCK INDICATE signals from the synthesizers, select which synthesizer is used. The selected synthesizer rf is applied to the exciter. The non-selected rf is attenuated by a PIN diode network.
- 1.4 Audio is routed from the exciter to the synthesizers. DEVIATION ADJUST potentiometers adjust the maximum deviation of each synthesizer.

2. THEORY OF OPERATION

(Refer to PEPS-38154 for schematic diagram details.)

The following description assumes a 3-frequency paging station. For a 2-frequency paging station, disregard all F3 or synthesizer 3 circuitry.

- FREQUENCY SELECT AND RESWITCHING **CIRCUITRY**
- 2.1.1 F1 SELECT (SYN 0) and F2 SELECT (SYN 1) from the simulcast control module enter at TB1-8 and TB1-9, respectively. These inputs are applied to logic network U4A, U6C, U2C, U2A, U6A, U2D, U3B, U6B, and U2B. In accordance with the truth table shown in Table 2, the output of U7B, U7C, or U7D goes high. This high turns on Q3, Q4, or Q5 causing the RF ENABLE to go low and turn on the selected synthesizer. (This condition assumes that the synthesizer is not outof-lock as described in paragraph 2.2.)

Table 2. Synthesizer Select Truth Table

1 Select (SYN 0)	F2 Select (SYN 1)	Synthesizer Selected
1		None (Station unkeyed.) 1 (U7B high)
- 교회 기 시대됐다.	# 113중 L 0 1 (16.중 5)	2 (U7C high)

- The high from U7B, U7C, or U7D is also applied to rf switching PIN diode network CR2, CR3, CR5, CR6, CR8, and CR9 to select the desired synthesizer rf which is applied to the exciter via J4. The non-selected rf is attenuated by the PIN diode network. The PIN diode network provides an attenuation of 60 dB minimum. (Measured at 14 MHz with the output terminated into a 50 ohm spectrum analyzer and an input impedance of 50 ohms.)
- 2.1.3 The high from U7B, U7C, or U7D is also applied to Q6, Q7, or Q8 to turn on channel indicator LED DS1, DS2, or DS3.

2.1.4 Manual Select switch S1 is normally set to F1 which allows the frequency select circuitry to operate as described above. During servicing, any one of the three synthesizers can be selected by setting S1 to F1, F2, or F3 and by keying locally. When F2 or F3 are selected, DS4 flashes red on the front of the chassis to indicate that the unit is in a LOCAL F2 or LOCAL F3 servicing mode. Timer U1 determines the flashing rate of DS4.

2.2 OUT-OF-LOCK INDICATE CIRCUITRY

- 2.2.1 OUT-OF-LOCK INDICATE signals from the three synthesizers enter at TB1-2, TB1-3, and TB1-4. If any of the OUT-OF-LOCK INDICATE signals go low and the respective frequency is selected, Q1 turns on and the TRANSMIT INHIBIT at TB1-13 goes low to inhibit the transmitter.
- 2.2.2 Any low OUT-OF-LOCK INDICATE signal also turns on Q2 and relay K1 to provide a RELAY output which can be used to activate an out-of-lock alarm as desired.
- 2.2.3 Any low OUT-OF-LOCK INDICATE signal also turns off Q3, Q4, or Q5 (depending on which synthesizer is out-of-lock). This causes the RF ENABLE to go high and disable the respective synthesizer.

2.3 AUDIO CIRCUITRY

J5 receives audio from the exciter and applies the audio to DEVIATION ADJUST potentiometers R19, R20, and R21. The DEVIATION ADJUST potentiometers set the maximum deviation level of the audio applied to the synthesizers.

3. MULTIFREQUENCY TRANSMITTER ALIGNMENT

3.1 SYNTHESIZERS

Align each synthesizer per Paging Synthesizer instruction section 68P81062E72 PURC Radio Paging Stations Control and Application Manual 68P81060E70.

3.2 EXCITER

Align the exciter per instructions in Exciter instruction section 68P81063E18 in manual 68P81062E70 at the lowest transmitter frequency.

3.3 INTERMEDIATE POWER AMPLIFIER (IPA)

Align the IPA per instructions in IPA instruction section 68P81063E21 of manual 68P81062E70 at the lowest transmitter frequency.

3.4 FINAL POWER AMPLIFIER (FPA)

Align the FPA per instructions in FPA instruction section 68P81063E24 of manual 68P81062E70 at the lowest transmitter frequency. Then perform athe following procedure.

3.4.1 Multifrequency PA Tuning

- Step 1. Note the power output level at the lowest frequency.
- Step 2. Select the highest frequency and note the loss in power output level from Step 1.
- Step 3. Turn the output tuning knob inward until 1/2 the loss noted in Step 2 is recovered.
- Step 4. Select the lowest frequency and note any change in output power from Step 3.
- Step 5. Turn the output tuning knob until 1/2 the loss in output power noted in Step 4 is recovered.
- Step 6. Repeat Steps 1 through 5 until the difference in the power between the highest and lowest power is 2 watts or less.
- Step 7. If there is a mid-frequency, select it. If output power is greater than 125 watts, reduce plate current to achieve 125 watts.
- Step 8. Tighten down the output coupling and tuning controls. Tighten the input coupling shaft and tuning control.

3.4.2 Power Degradation for Multifrequency Stations

Adjust plate current control to achieve output power levels per table below.

Frequency Spacing	Radio Power Output
0 to 1-1/2 MHz	125 Watts
1-1/2 to 2-1/4 MHz	110 Watts

4. DEVIATION SETTING

To set maximum deviation, proceed as follows.

- Step 1. Turn the exciter IDC control (R410) fully clockwise.
- Step 2. Adjust the DEVIATION ADJUST controls, accessible through the front of the multifrequency control chassis, for ± 5 kHz deviation. Do this for each frequency as shown below.

Frequency	Deviation Adjust (IDC) Control
F1	R19
F2	R20
F3	R21

5. JUMPER INFORMATION

5.1 MULTIFREQUENCY CONTROL MODULE TLN2675A AND TLN2703A

Jumpers are wired for either 2-frequency (TLN2675A) or 3-frequency (TLN2703A) operation as follows:

Jumper 2	Frequency	3-Frequency
JU1	OUT	OUT
JU2 1 (8) 1994	IN Agrant	. Vii. IN
JU3	OUT	IN

5.2 SIMULCAST CONTROL MODULE TLN2559B

JU2 is IN for single frequency operation and OUT for multifrequency operations.

5.3 STATION CONTROL MODULE TRN4854B

JU4 is IN for multifrequency operation. JU4 is OUT for single frequency operation when using a TLN2559B Simulcast Control Module. JU4 is IN for single frequency operation when using a TLN2559A Simulcast Control Module.

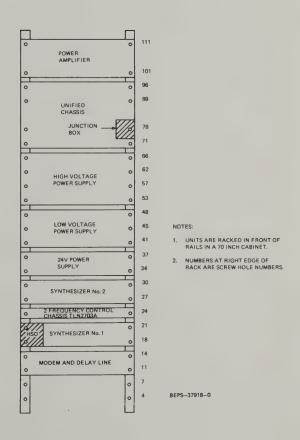


RE RACKED IN FRONT OF A 70 INCH CABINET.

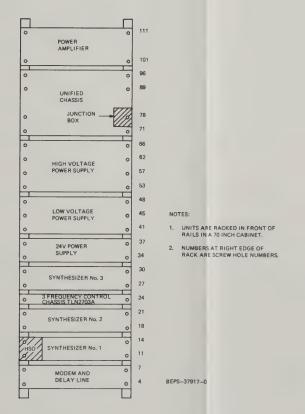
S AT RIGHT EDGE OF E SCREW HOLE NUMBERS.

Figure 1. PURC Radio Paging Station Rack Layout





2 FREQUENCY LAYOUT



3 FREQUENCY LAYOUT



MULTIFREQUENCY CONTROL MODULE

MODELS TLN2675A (2 FREQUENCY) TLN2703A (3 FREQUENCY)

NTERCONNECTING

PART NUMBERS FOR THE IN

E

PART NO.

1-80759D83 1-80759D84 1-80778D97 1-80778D99

NOT USED 1-80779 DO1 P/O 1-80778 D98 ASSIS

DO

NABLE F1 F2 RELAY A+ INH

REAR VIE

DEVIATION ADJUST F1 F2 F3

FRONT VIEW

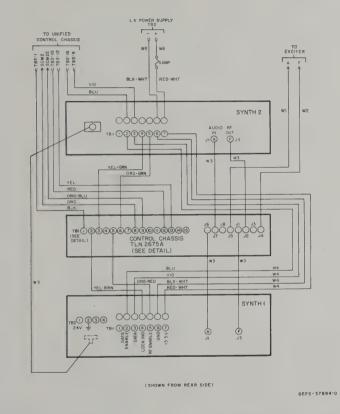
- AUDIO - RF-

NORMAL FI

LOCAL F2 O LOCAL F3

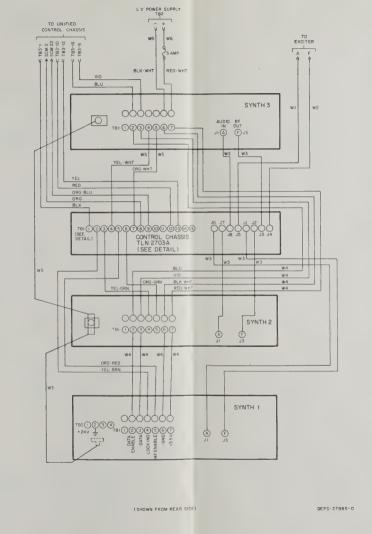
T





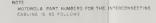
2-FREQUENCY INTERCONNECTING CABLING

NOTE MOTOROLA F CABLING IS	PART NUMBERS FOR THE INTERCONI AS FOLLOWS	NECTING
REFERENCE	PART NO.	
W1 W2 W3 W4 W5	1-80759D83 1-80759D84 1-80779D97 1-80778D99 NOT USED (-80779D01 P/O 1-80778D98	,
•	CONTROL CHASSIS LEGEND DETAIL	AUDIO RF
OOOOO	REAR VIEW	1 2 3 XCTR 1 2 3 XC
F1 F2 F3	DEVIATION ADJUST FI F2 F3 FRONT VIEW	NORMAL F





MODELS TLN2675A (2 FREQUENCY) TLN2703A (3 FREQUENCY)



DESIGNATION	PART NC
W1	1-80759083
W2	1-80759084
W3	1-80778097
W4	(-80778D99
W5	4-80781D31
W6	(-80779 D O1
_	P/O I-80778 D9E



,1	,	DEVIATION ADJUST		
Ó		F1 F2 F3	F1 F2 F3	
<u> </u>		FRONT VIEW		

LOCAL F3

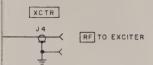
Motorola No. PEPS-38154-O (Sheet 1 of 3) 11/11/83- PH1

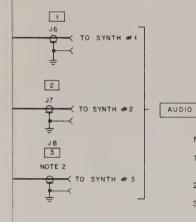
TCN6265A Contro	ol Board (3-Freque	ncy) PL-86	88-0
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
C1 thru 5	21-11015A07	capacitor, fixed; uF: .01 +80 - 20%	
C6		NOTUSED	
C7, 8 C9	21-11015A07	.01 + 80 ~ 20% NOT USED	
C10	23-84538G06	47 ± 20%; 20 V	
C11 C12	23-84538G04	15 ± 20%; 20 V .01 + 80 – 20%	
CIZ	21-11015A07	.01 + 80 - 20%	
0.01		diode: (see note)	
CR1 CR2, 3	48-83510F03	NOT USED silicon	
CR4		NOTUSED	
CR5, 6 CR7	48-83510F03	silicon NOT USED	
CR8, 9	48-83510F03	silicon	
CR10, 11	48-83654H01	silicon	
CR12	48-82466H13	silicon	
		light emitting diode: (see note)	
DS1 thru 3 DS4	48-88245C29 48-88245C28	green red	
504	40 00243020	TCG	
14 Abress O	20 00014801	connector:	
J1 thru 8	29-80014A01	TERMINAL, coaxial cable	
		relay:	
K1	80-82617M11	1 form "C"; coil res. 800	
		coil, rf:	
L1 thru 5	24-82135G10	choke; 100 uH	
		connector, plug:	
P1	28-83143M03	male; 14-contact	
Q1 thru 8	48-869642	transistor: (see note) NPN: type M9642	
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
		resistor, fixed ±; 1/4 W:	
R1, 2		unless otherwise stated NOT USED	
R3, 4	6-11009C49	1k	
R5, 6 R7, 8	6-11009C43	560 NOT USED	
R9, 10	6-11009C49	1k	
R11 thru 14	6 110000 40	NOTUSED	
R15, 16 ·R17, 18	6-11009C49	1k NOT USED	
R19, 20, 21	18-83452F19	variable; 100k	
R22 R23	6-125B70 6-11009C65	1; 1/2 W 4.7k	
R24	6-11009C69	6.8k	
R25 R26	6-11009C81	22k	
R27	6-11009C65 6-11009C47	4.7k 820	
R28	6-11009C49	1k	
R29 R30	6-11009C47 6-11009C49	820 1k	
R31	6-11009C47	820	
R32	6-11009C49	1k	
R33 R34 thru 38	6-11009C47 6-11009C65	820 4.7k	
R39, 40, 41	6-11009C61	3.3k	
R42 R43	6-11009C49 6-11009C37	1k 330	
R44	6-11009C49	1k	
R45 R46	6-11009C37	330	
R47, 48	6-11009C65 6-11009C49	4.7k 1k	
R49, 50, 51	6-11009C73	10k	
		switch:	
S1 .	40-83658N01	rotary; 5 position	
U1	51-84561L23	integrated circuit: (see note) timer	
U2, 3	51-82884L04	quad 2-input NOR gate	
U4 . U5, 6	51-82884L17 51-82884L02	triple 3-input NOR gate	
U7	51-83629M08	hex non-inverting buffer quad operational amplifier	
	me	chanical parts	
	3-138162	SCREW, tapping: 4-40 × 3/8"; 6 used	
	42-84284B01	RETAINER; 6 used	
	1-80778D92	CABLE Assembly, short; 2 used TCN6264A 3 used TCN6265A; includes:	,
	9-84968D01	CONNECTOR, female; single contact	
	30-83794C01 1-80778D93	CABLE, coaxial (WHT) 6"	
		CABLE Assembly, long; 4 used TCN6264A, 5 used TCN6265A; includes:	
	9-84968D01	CONNECTOR, female; single contact	
	30-83794C01	CABLE, coaxial (WHT); 8-1/2"	

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

MULTIFREQUENCY CONTROL MODULE

MODELS TLN2675A (2 FREQUENCY) TLN2703A (3 FREQUENCY)





NOTES:

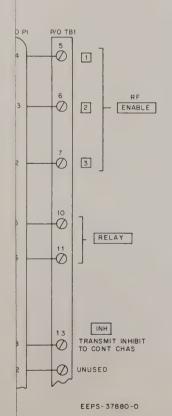
- Unless otherwise specified, all resistors are in ohms; all capacitors are in microfarads; and all inductors are in microhenries.
- 2. J3 and J8 are installed in TCN6265A Models only.
- DS4 flashes when S1 selects LOCAL F2 or LOCAL F3. DS4 is off when S1 selects normal F1.
- 4. Integrated circuit connections for this board are as follows:



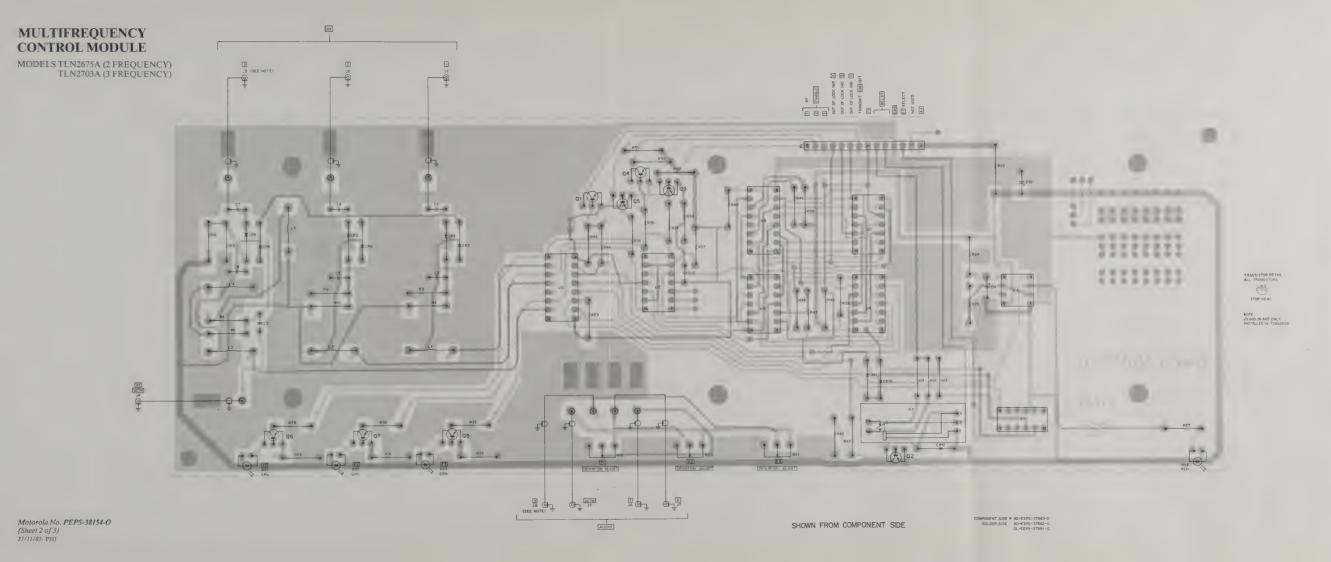
Reference Designation	Mfgr's Description	A+	GND
U1	Timer	8	1
U2, U3	Quad 2-Input NOR Gate	14	7
U4	Triple 3-Input NOR Gate	14	7
U5, U6	Hex Inverter Buffer	1	8
U7	Quad Op Amp	4	11

5. Jumpers are wired for either 2-frequency or 3-frequency operation as follows:

Jumper	2-Frequency	3-Frequency	
JU1	OUT	OUT	
JU2	IN	IN	
JU3	OUT	IN	



Motorola No. PEPS-38154-O (Sheet 3 of 3) 11/11/83- PHI



parts list

REFERENCE	MOTOROLA	ncy) P
REFERENCE	PART NO.	DESCRIPTION
		capacitor, fixed; uF
C1 thru 5	21-11015A07	.01 + 80 - 20% NOT USED
C6		NOTUSED
C7.8	21-11015A07	.01 + 80 - 20%
C9		NOT USED
C10	23-84538G06	47 ± 20%, 20 V
C11	23-84538G04 21-11015A07	15 ± 20%, 20 V .01 + 80 - 20%
C12	21-11015A07	
CR1		diode: (see note) NOT USED
CR2.3	48-83510F03	silicon
CR4		NOTUSED
CR5, 6	48-83510F03	silicon
CR7		NOTUSED
CR8, 9	48-83510F03	silicon
CR10, 11	48-83654H01	silicon
CR12	48-82466H13	silicon
		light emitting diode (see note)
DS1 thru 3	48-88245C29	green
DS4	48-88245C28	red
		connector TERMINAL, coaxial cable
J1 thru 8	29-80014A01	TERMINAL, coaxial cable
		retay
K1	80-82617M11	1 form "C", coil res 800
		coil, rf
L1 thru 5	24-82135G10	choke, 100 uH
		connector, plug
P1	28-83143M03	male; 14-contact
		transistor (see note)
Q1 thru 8	48-869642	NPN: type M9642
		resistor, fixed ±; 1/4 W
		unless otherwise stated
R1, 2		NOTUSED
R3, 4	6-11009C49	1k
R5, 6	6-11009C43	560
R7, 8		NOTUSED
R9. 10	6-11009C49	1k
R11 thru 14	0.110000040	NOT USED 1k
D17 10	6-11009C49	NOT USED
R15, 16 R17, 18 R19, 20, 21	18-83452F19	variable, 100k
R22	6-125B70	1; 1/2 W
R23	6-11009C65	1; 1/2 W 4.7k
R24	6-11009C69	6.8k
R25	6-11009C81	22k
R26	6-11009C65	4.7k
R27	6-11009C47	820
R28	6-11009C49	1k
R29	6-11009C47	820
R30	6-11009C49	1k
R31 R32	6-11009C47 6-11009C49	820 1k
R32 R33	6-11009C49 6-11009C47	1k 820
	6-11009C47 6-11009C65	820 4.7k
R34 thru 38 R39, 40, 41	6-11009C61	4 / K 3 3 k
H39, 40, 41	6.11000040	3.3K 1k
R43	6-11009C37	330
R44	6-11009C37 6-11009C49	1k
R45	6-11009C37	330
R46	6-11009C65	4.7k
R47, 48	6-11009C49	1k
R49, 50, 51	6-11009C73	10k
		switch
\$1	40-83658N01	rotary; 5 position
		integrated circuit: (see note)
U1	51-84561L23	timer
U2, 3	51-82884L04	quad 2-input NOR gate
U4	51-82884L17	triple 3-input NOR gate
U5, 6 U7	51-82884L02 51-83629M08	hex non-inverting buffer guad operational amplifier
		echanical parts
	3-138162	SCREW, tapping 4-40 x 3/8": 6 used
	42-84284B01	RETAINER: 6 used
	1-80778D92	CABLE Assembly, short; 2 used TCNI 3 used TCN6265A, includes
		3 used TCN6265A, includes
	9-84968D01	CONNECTOR, female, single innie
	30-83794C01	CABLE, coaxial (WHT) 6
	1-80778D93	GABLE Assembly, long; 4 used TCN6:
	9-84968D01	CABLE Assembly, long; 4 used TCN6. 5 used TCN6265A, includes CONNECTOR, female, single conta

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers

parts list

42-10217A02 1-80779D01

14-82882A01 14-82883A01

41-82885A01

29-812979 42-10217A02 42-82884A01

9-83012H02 29-812979

	bly Cable (2-Frequ bly Cable (3-Frequ		TKN8214A Modern TKN8998A 60" Mo		
FERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80759D83 28-83099K01 30-83794C01 37-82603D88 1-80759D84 28-83099K01 30-83794C01 37-82603D93 1-80778D97 28-83099K01 30-83794C01 1-80778D99 29-812979 42-10217A02	Cable AUDIO CABLE Assembly; includes. CONNECTOR, maler single contact. CONNECTOR, maler single contact. CABLE, coasta (NYT), 60° used SLEEVING, coded "A": 2 used RC CABLE Assembly; includes. CONNECTOR, maler single contact. CONNECTOR, maler single contact. CONNECTOR, maler single contact. 2 used CABLE, coasta (NYT); 12° used CABLE, coasta (NYT); 13° used		1-80781D30 14-84520E01 28-8450E01 29-81297 29-84078901 42-10217A02 1-80742D35 14-84502E01 29-812979 29-84078801 42-10217A02	MODEM CABLE Assembly 60" (Includes. HOOD, connector CONNECTOR, male: 25 contac CONNECTOR, male: 25 contac LUC, llanged space STAP, lie: 091 x 3.82" (WHT);
	1-80781D31	CABLE Assembly interconnect, 3-Freq.,			

IN9176A Hardw	are Kit (3-Frequen	cy) PL 8776-O
REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION

9-82578B01 CONNECTOR T 47-82977P01 ROD, slide synthesizer, 2 used 54-83261P01 LABEL, channel and frequency

lug, crimp terminal, 4 used STRAP, tie: .091 × 3.62" (WHT); 4 used

LUG, crimp terminal; 4 used STRAP, tie: (931 × 3.82" (WHT); 4 used CLIP, fuse; 2 used FUSE, 5 amp; 250 V

SLEEVING, coded blank; 2 used STRAP, tie: 091 x 3.62" (WHT); 20 used

CABLE Assembly, fused; includes:

CABLE Assembly, control; includes: RECEPTACLE, crimp; 2 used LUG, crimp terminal; 20 used

BODY, fuseholder CAP, fuseholder SPRING, fuseholder

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	1-80781D30	MODEM CABLE Assembly 60" (TKN8998A includes.
	14-84520E01	HOOD, connector
	28-84506E01	CONNECTOR, male: 25 contact
	29-812979	LUG, crimp terminal: 4 used
	29-84078801	LUG, flanged spade
	42-10217A02	STRAP, tie: .091 × 3.62" (WHT); 11 used
	1-80742D35	MODEM CABLE Assembly (TKN8214A)
		includes
	14-84502E01	HOOD, connector
	28-84506E01	CONNECTOR, male: 25-contact
	29-812979	LUG, crimo terminal, 4 used
	29-84078801	LUG, flanged spade
	42-10217A02	STRAP, tie: .091 × 3.62 (WHT); 10 used

REFERENCE	MOTOROLA PART NO.	DESCRIPTION
	3-138162	SCREW, tapping: 4-40 × 3/8": 2 used
	42-84284B01	RETAINER: 2 used
	75-82303N04	PAD, rubber
	5-84500B03	EYELET, special; 2 used
	15-83537N02	COVER, channel element
	1-80769D84	EXCITER CABLE Assembly Includes:
	9-83208C02	SOCKET
	9-84968D01	CONNECTOR, female; single contact
		(BNC); 2 used
	26-82254P01	SHIELD, oscillator
	30-83794C01	CABLE, coaxial (WHT); 18" used
	37-109120	GROMMET, rubber
	37-82603D88	SLEEVING, coded "A"
	37-82603D93	SLEEVING, coded "F"
	2-82360B34	NUT, speed: 1/4-14"; 18 used
	3-135038	SCREW, tapping: 14-14 x 3/4"; 18 used
	7-84172N02	BRACKET, rack
	9-82578B01	CONNECTOR, "T"
	42-10217A10	STRAP, tie 0.184 x 7.78"; 4 used
	47-82977P01	ROD, slide synthesizer, 2 used
	54-83261P01	LABEL, channel and frequency

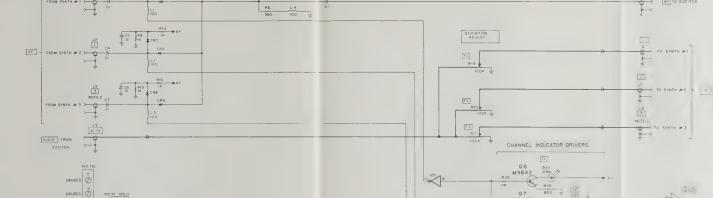
REFERENCE	MOTOROLA PART NO.	DESCRIPTION
01111100		
	3-129997	SCREW, machine: 4-40 × 5/16"; 3 used
	3-136850	SCREW, tapping: 6-32 × 1/2"; 4 used
	27-82978P01	CHASSIS
	36-83656P01	KNOB, control
	42-84284P01	RETAINER, 3 used
	15-82979P01	COVER
	38-010388	BUTTON, plug; 2 used (TRN9039A only)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
P1	15-83142M03	connector, receptacle: HOUSING, 14-contact
TB1	31-824738	terminal board: 15 terminals
	me	echanical parts
	39-82717M01 42-10217A02	CONTACT, receptacle; 13 used STRAP, tle: 091 × 3.62 (WHT); 8 used

TKN8989A Cable Barrier Strip



MODELS TLN2675A (2 FREQUENCY) TLN2703A (3 FREQUENCY)



LOCAL F3

Q8 M9642 m9642

RF ENABLE SWITCHES

Q1 M9642

Q3 M9642 Q4 M9642

Q5 M9642

RELAY DRIVER

R43 Q 2 M9642 TRANSMIT INHIBIT

SWITCH

R5 L5

TIMER

RF SWITCHING NETWORK

FI SELECT F1

INDICATE

LOCK - OUT OF LOCK 2



3 DS4 frashes when S1 selects LOCAL F2 or LT A . 4 . When s

4 Integrated circuit connections for this board are as for ows

	U7	Quad Op Amp	4
5	Jumpers are wired for either 2	2 frequency or 3-frequency	operation as follow:

Jumper	2-Frequency	3-Frequency
JU1	OUT	TUO
JU2	IN	IN
JU3	OUT	IN

Motorola No. PEPS-38154-0 (Sheet 3 of 3) 11/11/83- PHI





instruction manual revision

GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

INSTRUCTION MANUALS AFFECTED:

68P81061E95-0 PURC Radio Link Transmitter Instruction
Manual
68P81060E70-A PURC Radio Paging Station Instruction Manual

REVISION DETAILS:

The attached TRN5348B Transmitter Flat Audio Board page, PEPS-34631-A, replaces the following:

PEPS-35313-0 in 68P81061E95-0 PEPS-34631-0 in 68P81060E70-A

ATTACHMENT:

TRN5348B Transmitter Flat Audio Board Circuit Board
Detail, Schematic Diagram, and Parts List......PEPS-34631-A





```
DESCRIPTION
    DESCRIPTION capacitor, fixed: uF \pm 20%; 20 V; unless otherwise stated 4.7 .001 \pm 10%; 100 V 100 pF .068 \pm 5%; 100 V .043 \pm 5%; 50 V 4.7 .0326 \pm 2%; 50 V .0056 \pm 2%; 50 V .0056 \pm 2%; 50 V .0045 \pm 1%; 50 V 4.7 .0326 \pm 2%; 50 V .0045 \pm 1%; 50 V 4.7 .0326 \pm 2%; 50 V .0045 \pm 1%; 50 V 4.7 .056 \pm 2%; 50 V .0045 \pm 1%; 50 V 4.7 .056 \pm 2%; 50 V 4.7 .0
            4.7
.001 ± 10%; 100 V
4.7
220
            transistor: (see note)
NPN; type M9642
NPN; type M9642

resistor, fixed: ±5%; 1/4 W;
unless otherwise stated
56k
22k
1.8k
3.9k
120k
68k
6.8k
1k
4.7k
5.6k
1k
4.7k
5.6k
6.8k
3.9k
120k
66k
6.8k
470
11k
4.7k
22k
100k
4.7k
1.2k
6.8k
100
18k
                integrated circuit: (see note) IDC hybrid
```

on-referenced parts

RECEPTACLE, circuit board mount; 11 used JUMPER, plug-in; 2 used RECEPTACLE

e, diodes, transistors, and integrated circuits must bers.



instruction manual revision

SUPERSEDES SMR-4605

GENERAL.

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

INSTRUCTION MANUAL AFFECTED:

68P81060E70-A PURC Radio Paging Stations
Control and Application

REVISION DETAILS:

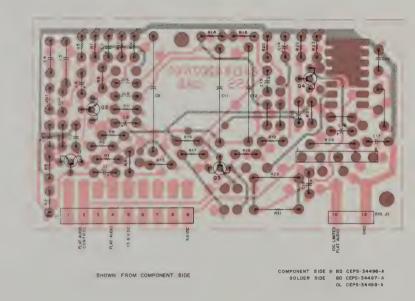
This revision includes information regarding the following paging synthesizer models:

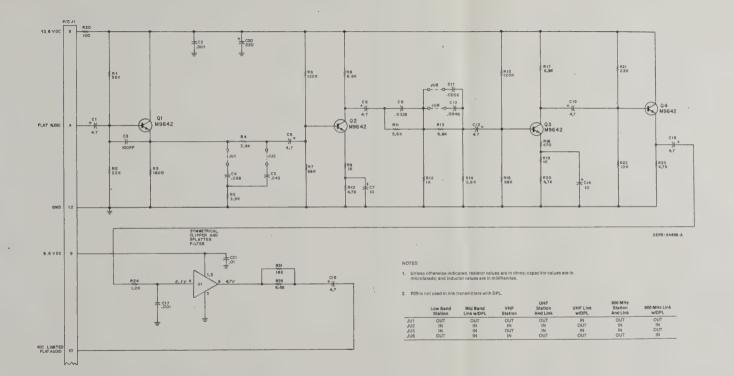
-- TLD2592A 132-150 MHz -- TLE2271A 406-420 MHz -- TLF1342A 928-960 MHz

In addition, a revised instruction section for the PURC Simulcast Control Module is also provided. Replace the existing instruction sections in your manual with the attached, revised instruction sections.

2. ATTACHMENTS

Paging Synthesizer Instruction Section.......68P81062E72-C Simulcast Control Module Instruction Section...68P81063E73-B





TRN5348B Transmitter Flat Audio Board Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34631-A 5/17/83- UP

parts list

REFERENCE SYMBOL	PART NO.	DESCRIPTION
		capacitor, fixed: uF ± 20%; 20 V;
		unless otherwise stated
C1	23-84538G02	4.7
C2	21-11015B13	001 ± 10%, 100 V
C3	21-11014H49	100 pF
C4	8-84637L48	.068 ± 5%, 100 V
C5	8-83813H14	.043 ± 5%, 50 V
C6	23-84538G02	4.7
C7	23-11013C07	10 ± 10%, 15 V
C8	23-84538G02	4.7
C9	8-84326A25	0326 ± 2%, 50 V
C11	8-84326A13	.0056 ± 2%, 50 V
C12	8-84326A30	0045 ± 1%, 50 V
C13	23-84538G02	4.7
C14	23-11013C07	10 ± 10%; 15 V
C15, 16	23-84538G02	4.7
C17	21-11015B13	.001 ± 10%, 100 V
C19	23-84538G02	4.7
		220
C20	23-84665F06	.01
C21	8-11017B08	.01
		4
Q1, 2, 3, 4	40.000040	transistor (see note) NPN, type M9642
Q1, 2, 3, 4	48-869642	NPN, Type M9042
		resistor, fixed: ± 5%; 1/4 W;
		unless otherwise stated
R1	6-11009E91	56k
R2	6-11009E81	22k
B3	6-11009E55	1.8k
R4.5		
H4, 5 R6	6-11009E63	3.9k 120k
Hb B7	6-11009E99	12UK 68k
B8	6-11009E93	
	6-11009E69	6.8k
R9	6-11009E49	1k
R10	6-11009E65	4.7k
R11	6-11009E67	5 6k
F12	6-11009E49	1k
R13	6-11009E69	6.8k
R14	6-11009E63	3.9k
R15	6-11009E99	120k
R16	6-11009E93	68k
R17	6-11009E69	6.8k
R18	6-11009E41	470
R19	6-11009E49	1k
R20	6-11009E65	4.7k
B21	6-11009E81	22k
R22	6-11009E73	10k
R23	6-11009E65	4.7k
R24 ·	6-11009C51	1.2k
R29	6-11009C69	6.8k
R30	6-11009E25	100
R31	6-11009C79	18k
U1	1-80755D60	integrated circuit: (see note) IDC hybrid
	non	-referenced parts
	9-83697M01	RECEPTAGLE, circuit board mount; 11 used
	9-84728L01	JUMPER, plug-in, 2 used
	28-84729L01	RECEPTACLE



instruction manual revision

SUPERSEDES SMR-4605

GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

INSTRUCTION MANUAL AFFECTED:

68P81060E70-A

PURC Radio Paging Stations Control and Application

REVISION DETAILS:

1. This revision includes information regarding the following paging synthesizer models:

-- TLD2592A 132-150 MHz -- TLE2271A 406-420 MHz -- TLF1342A 928-960 MHz

In addition, a revised instruction section for the PURC Simulcast Control Module is also provided. Replace the existing instruction sections in your manual with the attached, revised instruction sections.

2. ATTACHMENTS

Paging Synthesizer Instruction Section......68P81062E72-C Simulcast Control Module Instruction Section...68P81063E73-B



Communications Sector MODELS: TLB1572A, TLB1562A 30-36 MHz TLB1573A, TLB1563A 36-42 MHz TLB1574A, TLB1564A 42-50 MHz TLD2592A 132-150 MHz TLD2593A 150-174 MHz TLE2271A 406-420 MHz TLE2273A 450-512 MHz TLF1352A, TLF1342A 928-960 MHz

PERFORMANCE SPECIFICATIONS

Frequency Stability With HSO (High Stability Osc) Without HSO	Same as HSO (±.02 ppm) ±2 ppm − 30 to − 60 °C
Supply Voltage Requirements	+ 13.8 V dc ± 20%
Supply Current Drain	800 mA, maximum
Spurious and Harmonic Emissions	More than 85 dB below carrier (or station spec)
FM Noise With EIA Pre-emphasis With Flat Audio	55 dB 40 dB
Audio Response	±0.5 dB; 300 Hz to 3 kHz
Audio Harmonic Distortion	Less than 1% at ±3 kHz
Audio Sensitivity Low Band Other Bands	3 V to 4 V p-p for ±5 kHz at 1 kHz 2 V to 3 V p-p for ±5 kHz at 1 kHz
DC Deviation Range at Fc	±3 kHz to ±5 kHz
Data Deviation Range at Fc	±3 kHz to ±5 kHz
Data/Voice Mode Transient	Less than 100 Hz peak
Data Rise Fall Time	Less than 160 usec
RF Output	0.3 V rms to 1 V rms
Frequency Ranges: Low Band 30-50 MHz High Band 132-174 MHz UHF 406-420 MHz UHF 450-512 MHz 900 MHz 928-960 MHz	10.0 to 16.666 MHz 11.0 to 14.5 MHz 11.277 to 11.666 12.5 to 14.222 MHz 12.888 to 13.333 MHz

PAGING SYNTHESIZER INTERFACE REQUIREMENTS

HSO Supply Voltage	24 V dc ± 10%
HSO Power Consumption	11 watts, max.
Synthesizer Supply Voltage	13.8 V dc ±20%
Synthesizer Current Drain	800 mA dc
HSO RF Level	More than 1.0 V rms @ 50 ohms
Synthesizer RF Output Level	More than 0.3 V rms into cable terminated by exciter
Audio Input Level Data Levels Data Enable Levels	More than 4 V peak to peak @ 1 kHz "1" — More than 4 V "0" — Less than 0.7 V Enable — More than 7 V Disable — Less than 0.7 V
RF Enable Input	Enable — Less than 0.7 V (I _{Source} = 4 mA Disable — More than 9 V
Out of Lock Indicate	Isink less than 4 mA dc
Synthesizer Metering	TEK-5 or equivalent

PAGING SYNTHESIZER MODEL CHART 928-960 MHz (MULTIFREQUENCY) 30-36 MHz (DELETE HSO) 36-42 MHz (DELETE HSO) 42-50 MHz (DELETE HSO) 450-512 MHz 150.8-174 MHz 42-50 MHz 36-42 MHz 30-36 MHz 406-420 MHz 132-150 MHz 928-960 MHz CODE: = ONE ITEM SUPPLIED TLB1574A TLE2273A TLD2593A TLB1564A TLB1563A TLE2271A TLF1342A TLF1352A TLB1573A TLB1562A TLD2592A ITEM DESCRIPTION TRN5058A REGULATOR BOARD TKN8968A SYNTHESIZER CABLE TKN8967A HSO CABLE TKN8966A REFERENCE CABLE TRN5447A SYNTHESIZER HARDWARE • TLB8502A SYNTHESIZER BOARD 30-36 MHz TLB8503A SYNTHESIZER BOARD 36-42 MHz TLB8504A SYNTHESIZER BOARD 42-50 MHz TLD9333A SYNTHESIZER BOARD 150.8-174 MHz TLE5493A SYNTHESIZER BOARD 450-512 MHz TLE5491A SYNTHESIZER BOARD 406-420 MHz TLF6582A SYNTHESIZER BOARD 928-960 MHz TLD9332A SYNTHESIZER BOARD 132-150 MHz TRN5672A SYNTHESIZER HARDWARE TRN5960A SYNTHESIZER HARDWARE (DELETE HSO) TRN9035A SYNTHESIZER HARDWARE (MULTIFREQUENCY)

1. GENERAL DESCRIPTION

The paging synthesizer is a standard 19" rack mounted unit designed for use in Motorola Micor Paging Base Stations. The paging synthesizer provides a modulated rf signal to drive the exciter. Modulation can be either analog (voice and tones) or digital (binary paging codes or equivalent). Digital modulation including dc is made possible by the technique of dual-port modulation, where dc and low frequency data components are controlled by the digital modulation circuit, The higher frequency components of modulation (greater than 1 Hz) are accommodated by direct frequency modulation (fm) of the synthesizer voltage controlled crystal oscillator (VCXO or channel element). The paging synthesizer also provides high frequency stability by optional phase-locking to 100 kHz, 1 MHz. 5 MHz (standard) or 10 MHz high stability reference oscillators. Refer to the voltage regulator board and paging synthesizer schematic and block diagrams for the following descriptions. Figures 1 and 2 show component location and the solder side shield location.

2. FUNCTIONAL BLOCK DESCRIPTIONS

- 2.1 9.6 V AND 5 V REGULATORS (Refer to PEPS-34965 for details)
- 2.1.1 The 9.6 V regulator consists of a series pass transistor (Q400) which is driven by the regulator integrated circuit (U400). The regulated 9.6 V dc is provided to all analog and rf circuits, and is derived from the station 12 V dc supply (typically 13.6 V dc).
- 2.1.2 The 5 V regulator is supplied from the regulated 9.6 V dc supply, and provides regulated 5 V dc to all logic circuits requiring 5 V dc. The 5 V regulator consists of a 3-terminal integrated circuit (U401).

2.2 REFERENCE AMPLIFIER AND SWITCH (Q24, Q23)(Refer to Paging Synthesizer diagrams PEPS-34989 for details)

The reference amplifier and switch amplify the high stability oscillator signal to the proper logic levels and shape, for application to integrated circuits U14 and U16.

2.3 REFERENCE DIVIDER (U14, U15, U16)

The reference divider divides the High Stability Oscillator (HSO) frequency down to 100 kHz for use in phase locking U18, the 14.4 MHz oscillator. HSO frequencies of 100 kHz, 1 MHz, 5 MHz, or 10 MHz can be programmed by jumpers JU20 and JU21.

2.4 REFERENCE PHASE DETECTOR (U17)

One section of U17, (quad exclusive-OR gate) is used as a reference phase detector. The output consists

of pulses at 200 kHz, (twice the input frequency) having a width dependent on the phase error between the two input signals to U17.

2.5 REFERENCE LOOP FILTER (Q22 with associated circuitry)

Q22 amplifies the output pulses of U17 to approximately 8 volts peak-to-peak. R61, C62, R60, and C61 form an integrator circuit which recovers the dc value of Q22 output pulses, for use in controlling the frequency of U18 (14.4 MHz voltage controlled crystal oscillator, VCXO).

2.6 14.4 MHz VOLTAGE CONTROLLED CRYSTAL OSCILLATOR (U18)

U18 is a 14.4 MHz voltage controlled crystal oscillator which is phase-locked to the HSO. The output of U18 is used to provide one of the phase detector (U17) inputs, and also provide an input to the digital modulator circuitry (U11).

2.7 REFERENCE LOOP AMPLIFIER (Q21, Q20, Q19)

The reference loop amplifier amplifies U18 output signal to the proper logic levels and shape for application to U19 (reference loop divider) and U11 (digital modulator).

2.8 REFERENCE LOOP DIVIDER (U19, U20)

Reference loop dividers U19 and U20 divide the output frequency of Q19 by 144. This is the 100 kHz feedback signal to the phase detector (U17), which is compared in phase to the 100 kHz signal derived from the HSO.

- 2.9 DIGITAL MODULATOR (U9, U10, U11, U12, U13)
- 2.9.1 This circuit frequency modulates the output signal of Q19 to the "one" and "zero" frequencies upon command of the pulse insertion oscillator dividers U3 through U8.
- 2.9.2 Pulse insertion results in positive deviation by inserting extra pulses into the 14.4 MHz pulse train at the appropriate rate. This takes place in integrated circuit U12 (exclusive-OR gate with the input on pins 4 and 5; output on pin 6).
- 2.9.3 Pulse blanking, similarly, creates negative deviation by blanking pulses from the 14.4 MHz pulse train at the appropriate rate. This occurs in integrated circuit U11 (input pins 12 and 13, output pin 11).
- 2.9.4 Pulse insertion is selected upon command by a data enable and a data "one". Pulse blanking is

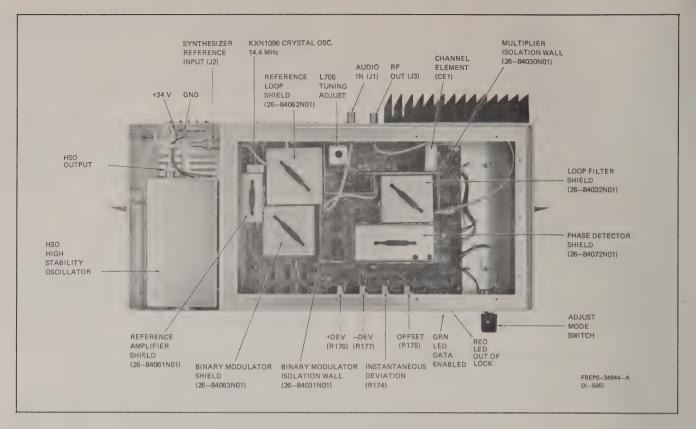
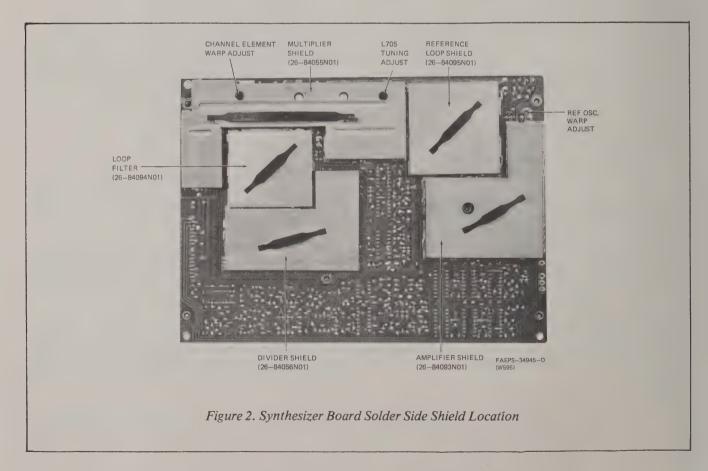


Figure 1. Paging Synthesizer Component Location



selected upon command by a data enable and a data "zero". The appropriate rate of insertion pulses or blanking pulses is determined by the following formula:

$R = \frac{Deviation \times 14.4 MHz}{Carrier Frequency (MHz)}$

The frequency modulated 14.4 MHz is divided by two to 7.2 MHz, by U13 (input pin 11, output pin 9) and serves as the reference input for the main synthesizer loop phase detector U602.

2.10 PULSE INSERTION OSCILLATORS AND DIVIDERS (U1 and U3-U8)

U1 is a dual timer which serves as two independent RC oscillators. The outputs are frequency divided by U3 through U8 to obtain the pulse insertion and blanking rates mentioned in paragraph 2.9. These are necessary for (+) and (-) data deviation of the 14.4 MHz signal. R176 and R177 are precision potentiometers for setting the "one" and "zero" (or + and -) deviations respectively. In order to obtain the proper deviations, jumpers JU1 through JU18 which set the divider ratios, must be properly installed.

2.11 MAIN LOOP DIVIDER (U602), ROM (U604)

2.11.1 U602 is an integrated circuit which is used to divide the 7.2 MHz reference input (pin 2) to either 2.0833 kHz or 2.500 kHz output (pin 5) depending on the frequency band (900 MHz, UHF, or HB, LB respectively). The internal ÷63/÷64 prescaler is driven by U601 and in turn drives the A and B dividers internally. The choice of 2.0833 kHz, or 2.500 kHz, and the numbers programmed into the A and B dividers are stored in U604 and called out on "D" lines (U604-12,11,10,9) by U602 addressing the "A" lines (U604-5,6,7).

2.11.2 The A and B dividers provide the loop output at 2.0833 kHz or 2.500 kHz (U602-9). This frequency is derived from the channel element (CE1). U602 pin 9 is also used to signal the $\div 3/\div 4$ prescaler (U601) when to divide by 4 rather than 3. The $\overline{\text{CO}}$ and $\overline{\text{CI}}$ lines (pins 15 and 16) signal to U601 how many times to divide by 4 rather than 3. This information is stored in U604 ROM and (like A and B divider programs) differs from channel to channel.

2.12 SAMPLE AND HOLD PHASE DETECTOR (U603)

Integrated circuit U603 is used to compare the two divider IC output phases (2.0833 kHz or 2.500 kHz depending on the frequency band). It ultimately generates an output signal on pin 15, which after further filtering and amplification, is used to control the frequency of the channel element (CE1).

2.13 LOOP DC AMPLIFIERS (U609, U21) LOOP FILTERS, AND LOOP SUMMERS (U21)

- 2.13.1 DC amplifier U609 amplifies the output signal of U603 and applies this signal to the loop filter.
- 2.13.2 The loop filter is composed of R122, R123, C23, C24, and C28. It is a standard lead-lag filter and results in a loop bandwidth of about 1/2 Hz, with a damping factor of approximately 0.65. These parameters determine that the cross-over frequency between pulse insertion/blanking modulation, and the modulation summed in this loop is approximately 1 Hz.
- 2.13.3 The first loop summer (U21-8,9,10) adds binary modulation to the loop dc control voltage and amplifies the data amplitude by a factor of 2. Following the first loop summer is a 3 kHz passive RC low pass filter (R79, R78, R77, C74, C75, and C76), which has no effect on the dc control voltage, but shapes the data modulation to prevent excessive modulation sideband splatter. This filter is buffered by unity gain amplifier Q25, Q26.
- 2.13.4 U21 pins 2 and 3 is the second loop summer which is used to sum voice or tone modulation with the loop dc control voltage. For modulation, it has a voltage gain of unity; for the loop signals, it has a voltage gain of two. The output (pin 1) is applied directly to the channel element (CE1) modulation port (pin 4). This controls the channel element frequency so that it is phase locked to the 7.2 MHz output of the digital modulator circuit, and also directly frequency modulates it with voice or tones, or splatter filtered data.

2.14 CHANNEL ELEMENT (CE1)

The channel element serves as the voltage controlled crystal oscillator (VCXO) in the main synthesizer loop, and provides an output signal between 10 and 16-2/3 MHz. The output signal is amplified and drives the exciter in the transmitter portion of the base station.

2.15 EXCITER AMPLIFIER/BUFFER SWITCH (Q701, Q36, Q37, CR1, CR2)

Q701 (not used on 900 MHz model) amplifies the output of channel element (CE1) to the proper level to drive a base station exciter. Q36 and Q37 buffer the output of Q701 to prevent loading by the coaxial cable used to connect it to the base station exciter. CR1 and CR2 PIN diodes used in a series-shunt rf switch greatly attenuate the signal delivered to the base station exciter, if rf enable is a high level dc signal. The output of the synthesizer (Q36 and Q37 emitters) is frequency multiplied in the base station, just as a normal channel element signal would be: \times 3 for low band, \times 12 for high band, \times 36 for UHF, and \times 72 for 900 MHz.

2.16 FREQUENCY MULTIPLIERS (0706, 0702, 0703, 0704) AND BUFFER (040)

- 2.16.1 For low band models, Q702 and Q703 are not used. Q706 is a unity gain amplifier, and Q704 and associated components form a frequency tripler. The output of Q704 is limited in amplitude by CR6 and CR7, buffered by Q40 before being applied to U601 pin 1 (divide by 3/divide by 4 prescaler).
- 2.16.2 For all other models, Q706 is a unity gain buffer, Q702 is a frequency tripler, and Q703 and Q704 are both frequency doubling stages. The overall frequency multiplication is a factor of 12. CR6, CR7, and Q40 are as described before. Low band and the other frequency bands differ so that the phase detector input frequencies may remain reasonably high and still achieve the desired channel spacings.

$2.17 \div 3/ \div 4$ PRESCALER (U601)

- 2.17.1 U601 is normally used to allow synthesizer operation from a 400 MHz or higher voltage controlled oscillator. In this synthesizer the highest frequency from Q40 is 174 MHz. U601 used in this application with frequency multipliers, allows all of the desired channel spacings to be achieved without resorting to excessively low phase detector (U603) input frequencies.
- 2.17.2 $\overline{\text{C0}}$ and $\overline{\text{C1}}$ (U601 pins 7 and 6) receive instructions from U604 via U602 as to how many cycles of its operation U601 should be in the divide by 4 mode during a loop pulse period (loop pulse is signaled from U602 pin 9 to U601 pin 5). In this manner an assortment of non-integer divisors are achieved. The total frequency divisor from CE1 pin 3 to U602 pin 9 is:

Low Band:
$$N_T = \frac{3(64A + 63B) + C}{3}$$

Other Bands: $N_T = \frac{3(64A + 63B) + C}{12}$

(where A and B are U603 divider programs, and C is the U601 program).

2.18 LOSS OF LOCK DETECTOR (U606, U607)

The loss of lock detector consists of two voltage comparators (both within U606); a reference loop detector and a main loop detector. The outputs of these are combined in U607, a quad OR-gate. The output of U607 is dc amplified by Q39, stored in delay capacitor C93, and used to inhibit transmitter keying by Q33 in the event of loss of lock. The delay time constant components C93, and R164, are used to prevent false transmission during acquisition of lock or other transient or oscillatory conditions. Q32 drives DS1 which provides a visual indication for out of lock condition.

2.19 DATA MODULATOR (Q3-5, Q9-14, Q31, Q42, Q43, U22)

- 2.19.1 The data modulator performs two functions:

 First, it translates data levels to precisely the peak-to-peak voltage level necessary for modulation of the main synthesizer loop via U21 pin 10. This is adjustable with R174. Secondly, it provides a dc level which is superimposed on the data applied to U21 pin 10. This level is adjustable (in the data enable mode) by R175. This dc level is necessary for the following conditions:
- To change the data levels, so they are symmetrical about the main loop dc control voltage for equal plus and minus frequency deviations.
- To change the data levels so they are not symmetrical about the main loop dc control voltage for unequal plus and minus frequency deviations, if desired.
- Q3,4,9,13, and 14 perform the first function by switching R174 to either a fixed high level voltage (data "1") or a fixed low level voltage (data "0"). R174 is switched by either Q13 or Q14, but not both simultaneously. The resistance setting of R174 along with fixed resistors R137 and R134 determine the voltage amplification of op. amp. U22 for the data levels.
- 2.19.2 The circuit composed of Q5, Q31, Q42, and Q43 connects R175 into the circuit in the data enable mode. Switching transistors Q42 and Q43 are both on at the same time thus connecting R175 between regulated 9.6 V dc and ground. The voltage setting of R175 provides the adjustable dc level function mentioned above in the data enable mode. This voltage is summed with the data in op. amp. U22, via R133 and along with R134, provides unity gain for this level. DS2 provides a visual indication of the Data Enable mode.

2.20 DATA SIMULATOR (U23)

- 2.20.1 This circuit provides a simulated 300 bps data stream which, when selected by the rotary switch S1 (INSTANTANEOUS DEVIATION ADJUST position) on the synthesizer panel allows the peak-to-peak data deviation to be set using R174.
- 2.20.2 In the OFFSET ADJUST mode of rotary switch S1, a simulated data stream and a pulsating data enable are available. This allows for convenient setting of the data bias control R175, by adjusting for minimum frequency transient upon change of data enable states (voice/tone to data, and vice versa). Final adjustment of R174 and R175 cannot be made until the +DEV (R176) and -DEV (R177) controls are set. The rotary switch must always be returned to the normal (OPERATE) position after servicing the station. An ADJUST MODE LED (DS3) is provided to indicate if the switch is not in the OPERATE mode.

2.20.3 U23 is a self contained RC oscillator and frequency divider. Oscillation of U23 is controlled by R139, R140, and C81. The frequency of oscillation determines the rate of the simulated data stream. Q34 buffers the simulated data for application to the binary modulator through the rotary switch when selected. U23 further frequency divides the oscillation frequency to provide a simulated pulsating data enable signal of approximately 1.5 Hz. This circuit is included as an aid to servicing and alignment, and is not normally activated during system operation.

3. SUMMARY

The paging synthesizer allows analog or digital (binary) modulation of paging base stations including low band, high band, and UHF. It not only provides do modulation capability, but high stability transmitter frequency at the same time; this is necessary for simulcast system applications.

4. ALIGNMENT PROCEDURE

4.1 GENERAL

4.1.1 Monitor the transmitter output frequency with an adequate frequency counter (typically accurate to ± 1 Hz). The transmitter modulation should be monitored with a Motorola Service Monitor (R1200) with a deviation meter or equivalent.

4.1.2 On later model synthesizers:

- TP1 can be measured at TB1 "test points" when S1 is in ON position.
- TP2 can be measured at TB2 "test points" when S1 is in OPERATE position.

4.2 MULTIPLIER

(Use a Motorola TEK-5 or equivalent metering panel.)

Step 1. Low Band — Peak L705 on Meter 3.

Step 1A. Other Bands -

- Peak L703 on Meter 1
- Peak L704 on Meter 2
- Peak L705 on Meter 3

Step 2. Repeat Step 1A.

4.3 14.4 MHz VOLTAGE CONTROLLED CRYSTAL OSCILLATOR (VCXO)

Adjust U18 warp coil (located through small hole on top of chassis, (see Figure 3) for 1.5 V ± 0.1 V dc at test point 1 (junction of C82 and R150). A high resistance voltmeter (11 megohm, R1002 or equivalent) must be used.

4.4 CHANNEL ELEMENT (CE1)

Step 1. Set the adjust mode switch on the synthesizer to the OPERATE mode. **DO NOT** apply any modulating signals.

Step 2. Set CE1 warp capacitor for $4.7 \text{ V} \pm 0.3 \text{ V}$ dc at test point 2 (junction of R151 and C83). Use a high resistance voltmeter as before. Refer to Figure 3 for location of tuning hole.

4.5 HIGH STABILITY OSCILLATOR (HSO)

The high stability oscillator (Y1) should be allowed to warm up for at least 30 minutes before proceeding any further. This is necessary for the oven in the oscillator to reach its operating temperature.

Step 1. Key the transmitter.

Step 2. Adjust the HSO to the assigned transmitter output frequency $\pm 10 \text{ Hz}$.

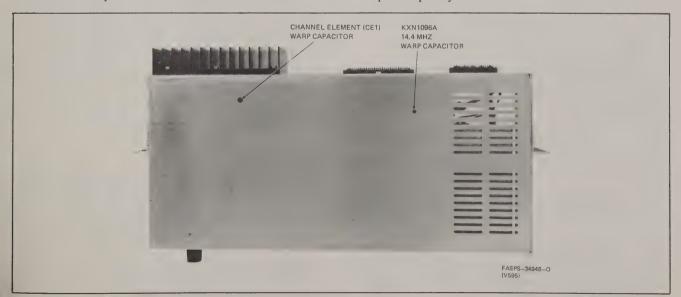


Figure 3. Synthesizer Tuning Adjustment Location

- Step 3. Repeat paragraphs 4.3 and 4.4.
- 4.6 DIGITAL MODULATOR (+ DEV and DEV) (Refer to paragraph 4.10 before performing this procedure.)
- Step 1. Set the panel switch on the synthesizer to the OPERATE position.
- Step 2. Set the switch on the TSI module to the TEST position. The TSI module is located in the station control chassis.
- Step 3. Pulse Insertion: Select the + DEVIATION position of the switch on the TSI module. Set R176 (+ DEV) on the synthesizer panel for the transmitter output frequency of $F_T + 4.000 \, kHz$.
- Step 4. Pulse Blanking: Select the DEVIATION position of the switch on the TSI module. Set R177 (- DEV) on the synthesizer panel for transmitter output frequency of $F_T 4.000 \, kHz$.
- Step 5. Return the TEST switch on the TSI module to the normal position.

4.7 INSTANTANEOUS DEVIATION ADJUST (R174)

- Step 1. Set the panel switch on the synthesizer to the INSTANTANEOUS DEVIATION ADJUST mode. The adjust mode and data enable lamps should light. The transmitter is now modulated with simulated data.
- Step 2. Set R174 on the synthesizer panel for $\pm 4.0 \text{ kHz}$ deviation.

4.8 OFFSET (R175)

- Step 1. Disconnect the out-of-lock (transmitter inhibit) line to the station.
- Step 2. Set the panel switch on the synthesizer to the OFFSET ADJUST position. The adjust mode lamp should be lit, and the data enable lamp should be pulsating slowly.
- Step 3. Set R175 on the synthesizer for minimum transient or bounce on the transitions from no modulation to data modulation or vice-versa.
- Step 4. Re-connect the out-of-lock line to the station. The station should remain keyed. The out-of-lock lamp should not be lit.
- Step 5. Return the panel switch to the OPERATE position. The adjust mode lamp should not be lit, and the data enable lamp should be lit only if the modem is detecting data.

4.9 HIGH STABILITY OSCILLATOR

Readjust the HSO if necessary and place the station back in service.

4.10 ALIGNMENT PROCEDURE FOR BINARY MODE FREQUENCY OFFSET

- 4.10.1 If a frequency offset in the binary mode is desired, the entire alignment procedure is the same as previously described except for replacing paragraph 4.6 with the following procedure:
- 4.10.2 Digital Modualtor (+ DEV and DEV)
- Step 1. Set the panel switch on the synthesizer to the OPERATE position.
- Step 2. Set the switch on the TSI module to the TEST position.
- Step 3. Pulse Insertion: Select the + DEVIATION position of the switch on the TSI module. Set R176 (+ DEV) on the synthesizer panel for the transmitter output frequency of $F_T + 4.000 \, \text{kHz} + \text{offset}$.
- Step 4. Pulse Blanking: Select the DEVIATION position of the switch on the TSI module. Set R177 (- DEV) on the synthesizer panel for transmitter output frequency of $F_T 4.000 \, kHz + offset$.

Example: Desired OFFSET = + 100 Hz, using + DEV: $F = F_T + 4.1 \text{ kHz}$; using - DEV: $F = F_T - 3.9 \text{ kHz}$.

Step 5. Return the TEST switch on the TSI module to the normal position.

5. OPERATIONAL TESTS

5.1 REGULATORS

Check both the 9.6 V dc ± 0.5 V and 5 V dc ± 0.1 V regulators for proper operation.

5.2 REFERENCE LOOP

Jumpers JU20 and JU21 determine which External Reference frequency is applied to the synthesizer and are "in" or "out" accordingly (see note 4 on synthesizer schematic diagram). With the proper input signal applied, check for the following:

- 100 kHz signal at U17-1,2 (Phase Detector)
- 14.4 MHz signal at collector of Q19
- U18 Steering Line (TP1) set for 1.5 V dc

5.3 MAIN LOOP

In order to test the Main Loop, the Reference Loop must be functioning normally, U604 (ROM), and the channel element must be installed, and jumpers JU22-JU25 removed accordingly. With these conditions met, perform the following tests:

- Check for 7.2 MHz signal at U602-2.
- Check that Multiplier metering positions 1, 2 and 3 are normal when L703, L704, and L705 are tuned.
- Check for a VHF signal of approximately 1 V P/P (350 mV rms) at U601-1.
- Check for a VHF signal of approximately 225 mV rms at U602-25.
- Check for a 2.083 kHz (for UHF and 900 MHz units) or a 2.5 kHz (for LB and HB units) square wave signal of approximately 4 V P/P at U603-2.
- Check for 2.083 kHz or 2.5 kHz signal pulses of approximately 2.8 V P/P at U603-23.
- Check for 2.083 kHz or 2.5 kHz Truncated ramp signal greater than or equal to 1.4 V P/P at U603-24.
- Check that the voltage at U603-15 is at least 3 V dc but not more than 8 V dc (no ac voltage present).
- Check that the voltage at TP2 is at least 3 V dc but not more than 6 V dc (no ac voltage present).
- The RF output should be approximately 1.0 V rms when the RF ENABLE line is low (less than 0.7 V). When the RF ENABLE line is high, the RF output should be approximately 10 mV rms.

5.4 PULSE STUFFING CIRCUIT (DATA ENABLE = 1, and JU1-JU8 removed accordingly)

- Check for a signal of approximately 12 kHz at 4 V P/P at U5-14 (Data = 0).
- Check for a signal of approximately 12 kHz at 4 V P/P at U6-14 (Data = 1).
- Check that Freout = Fx − approx. 4 kHz ÷ M when Data = 0.
- Check that Freout = Fx + approx. 4 kHz ÷ M when Data = 1.

NOTE

Where M = station multiplier; LB = 3, HB = 12, UHF = 36, and 900 MHz = 72.

5.5 DATA MODULATOR

- Step 1. Set the panel switch on the synthesizer to the INSTANTANEOUS DEVIATION ADJUST position. The switch remains in this position for Steps 2, 3, and 4.
- Step 2. Check for 2 V P/P at the junction of R174 and R19.
- Step 3. Check for a 150 Hz square wave of approximately 4 V P/P at CE1-4. Adjust INSTANTANEOUS DEVIATION control R174 if necessary.
- Step 4. Check that the voltage at U22-7 is at least 4 V dc but not more than 5 V dc, and is variable with the OFFSET control R175. Set this voltage to 4.8 V dc.
- Step 5. Set the panel switch on the synthesizer to the OFFSET ADJUST position.
- Step 6. Check for a square wave at U22-7. This waveform can be varied with the OFFSET control R175 above and below 4.8 V dc. Adjust R175 for minimum dc voltage shift between data and voice modulation (not critical).
- 5.6 VOICE MODULATION (Data Enable = 0)
- Step 1. Apply a 1 kHz tone @ 1.4 V rms to the VOICE INPUT connector J1.
- Step 2. Measure this 1 kHz tone at TP2. Level should be 3 V P/P.

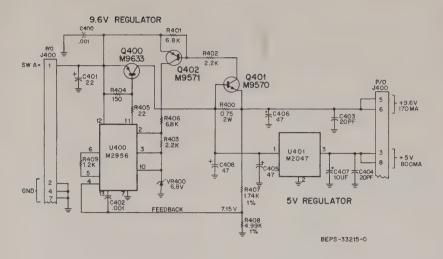
NOTE

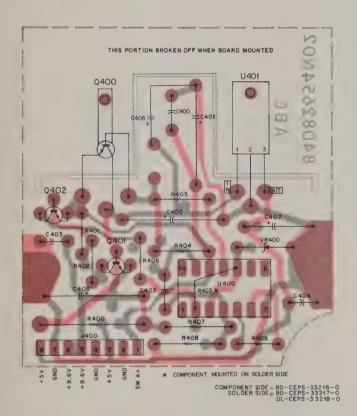
If any of the previously described operational tests fail to perform as noted refer to the Synthesizer Troubleshooting Guide for further information.

6. TROUBLESHOOTING GUIDE AND PROCEDURE

Table 1. Paging Synthesizer Troubleshooting Guide

Symptom	Possible Causes
No RF output	RF Enable is not low. Q36, Q37, or Q701 is bad. CR1 is open or CR2 is shorted.
Out-of-Lock (Main Loop)	OFFSET ADJUST improperly set. JU22, 23, 24, 25 improperly installed. Multiplier not tuned or defective. ROM U604 defective. Defective Loss-of-Lock Detector circuit. R120 wrong value.
Out-of-Lock (Reference Loop)	U18 not properly tuned. Defective U18. JU20, JU21 improperly installed. Loss of HSO signal (External Ref.). Defective amplifier (Q21, Q20, Q19). Defective Loss-of-Lock Detector circuit.
Distorted Binary Modulation	Pulse stuffing/snatching (+ DEV and - DEV) not properly set, or defective. INSTANTANEOUS DEV not properly set, or defective. Voice Input not connected to station. JU22, 23, 24, 25 improperly installed. JU1-18 improperly installed. Defective amplifier (Q21, 20, 19). Defective oscillator U1, etc. Defective U21. Defective R173.
Mode change transients (BINARY to VOICE, etc.)	OFFSET ADJUST not properly set or defective. Station XCTR LEVEL improperly set. Line Level (600 ohms) too high to station.
Distorted Voice or Tone Modulation	Station XCTR LEVEL improperly set. Station IDC improperly set. JU22, 23, 24, 25 improperly installed. Defective U21. Defective R173. CE1 not tuned properly or defective.
Carrier Frequency in error by 2.083 kHz or 2.500 kHz, etc.	Defective U601. Defective U604. Defective program stored in U604.





SHOWN FROM COMPONENT SIDE

parts list

	e Regulator Board		PL-7660-O
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
		capacitor, fixed: uF ± 10%;	
		unless otherwise stated	
C400	21-83596E13	.001; 500 V	
C401	23-84762H16	22; 20 V	
C402	21-83596E13	.001; 500 V	
C403, 404	21-11014H32	20 pF ± 5%; 100 V	
C405, 406	23-83214C31	47 ± 20%; 15 V	
C407	23-84762H03	10; 20 V	
C408	23-83214C31	47 ± 20%; 15 V	
		connector, plug:	
J400	28-83323N02	male; 8-contact	
		transistor: (see note)	
Q400	48-869633	PNP; type M9633	
Q401	48-869570	NPN; type M9570	
Q402	48-869571	PNP; type M9571	
		resistor, fixed: ohms \pm 5%; 1/4 W;	
		unless otherwise stated	
R400	17-82036G13	0.75; 2 W	
R401	6-185A69	6.8k; 1/8 W	
R402, 403	6-185A57	2.2k; 1/8 W	
R404	6-11009A29	150	
R405	6-11009A09	22	
R406	6-185A69	6.8k; 1/8 W	
R407	6-10621C18	1740 ± 1%	
R408	6-10621C62	4990 ± 1%	
R409	6-185A51	1.2k; 1/8 W	
		Integrated circuit: (see note)	
U400	51-83629M56	regulator; 9.6 V	
U401	51-84320A47	regulator; 5 V	
		voltage regulator: (see note)	
VR400	48-82256C37	Zener; 6.8 V; 1 W	

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

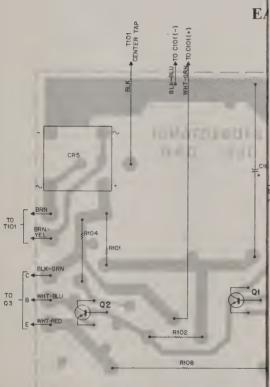
TRN5058A Voltage Regulator Board Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34965-O 6/3/83 - V & G



wer	Supply Chassis a	nd Hardware PL-8111-
ICE L	MOTOROLA PART NO.	DESCRIPTION
	23-83093G21	capacitor, fixed: 2000 uF + 100 - 10%; 100 V
	65-475395	fuse: 1/2 amp: 125 V; slow blow type
	48-869627	transistor: (see note) NPN; type M9627
	40-84241G03	switch: 2 position; slide
	25-83043L01	transformer: pri: #1 BLK-WHT, BLK-GRN; res. 29 ohms pri:#2 BLK-YEL, BLK-RED; res. 32 ohms sec: BRN, BRN-YEL with BLK center top; res. 1 ohm
	31-120965	terminal board: 4 contact
	28-83176L01	connector, plug: male; 3-contact
	m	echanical parts
	2-119913 3-122922 3-134212	NUT, 8-32 × 11/32 × 1/8"; 4 used SCREW, machine: 6-32 × 5/8"; 2 used SCREW, tapping: 4-40 × 5/16"; 4 used

SCREW, machine: 6-32 × 5/8"; 2 used SCREW, tapping: 4-40 × 5/16"; 4 used SCREW, tapping: 4-40 × 1/4"; 4 used SCREW, tapping: 6-32 × 5/16"; 4 used SCREW, tapping: 6-32 × 5/16"; 4 used SCREW, tapping: 6-32 × 38"; 6 used WASHER, shoulder; 4 used BRACKET, tuseholder BRACKET, theat sink mounting; 2 used RECEPTACLE, fused SOCKET, transistor; 3 used RECEPTACLE, female; 3 contact INSULATOR, transistor INSULATOR, paper COVER, transistor HEAT SINK TERMINAL, socket; 3 used LUG, tongue 3-134212 3-134169 3-135575 3-136934 4-844093 7-83181L01 7-84139N01 9-82083C03 9-82673A01 9-83175L01 14-865854 14-84309N01 15-83559L01 26-84212E02 29-84151L01 LUG, tongue TERMINAL, plug; 3 used STRAP, tie; 10 used RETAINER; 6 used 29-847854 29-84150L01 42-10217A02 42-83123F01 54-84789L01 30-83211C04 37-107998 LABEL, WARNING CABLE and PLUG AC SLEEVING 29-812979 LUG, crimp terminal; 4 used

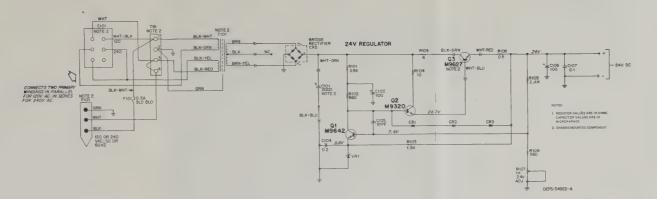
imum performance, diodes, transistors, and integrated circuits must Motorola part numbers.

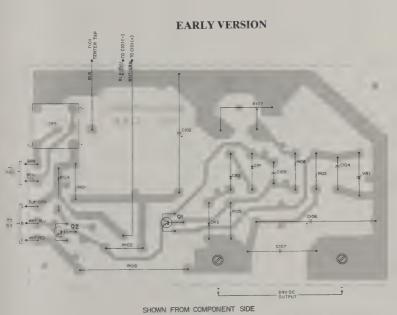


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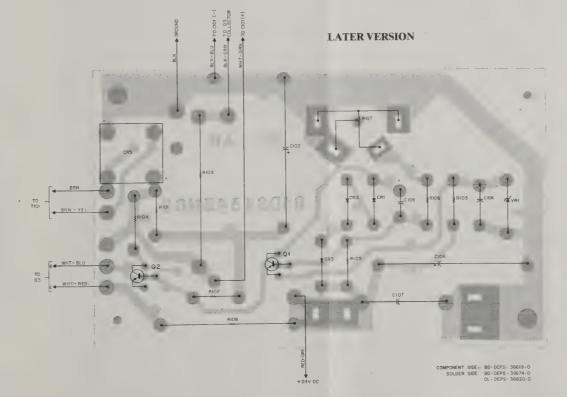
TPN1195A Power Supply Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34988-A 6/3/83 - V & G







COMPONENT SIDE - BD-CEPS-34923-0 OL-CEPS-34924-A



parts list

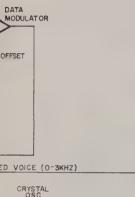
REFERENCE	MOTOROLA PART NO.	DESCRIPTION
STMBUL	PART NO.	
		capacitor, fixed:
C102	23-82077C01	100 uF + 150-10%; 35 V
C104	21-82372C05	0.2 uF + 80-20%; 25 V
C105	21-84493B27	51 pF ± 5%; 200 V
C106	23-82077C01	100 uF + 150-10%; 35 V
C107	8-82317B01	0.1 uF ± 10%; 100 V
		diode: (see note)
CR1, 2, 3	48-83654H01	silicon
CR5	48-84621E05	bridge, rectifier; 200 V
		transistor: (see note)
01	48-869642	NPN; type M9642
Q2	48-869320	NPN; type M9320
		resistor, fixed: ±5%; 1/4 W:
		unless otherwise stated
R101	6-11009A63	3.9k
R102	6-11009A43	560
R103	6-11009A53	1.5k
R104	6-125C01	10: 1/2 W
R105	6-11009A58	2.4k
R106	6-11009A43	560
R107	18-83168C03	variable: 1k
R108	17-82586H08	W.W. 0.5: 5 W
R109	17-82177B55	W.W. 8.0; 7 W
		voltage regulator: (see note)
VR1	48-82256C02	Zener type; 6.8 V
	m	echanical parts
	3-84482M01	SCREW, machine; 6-32 x 5/16"; 2 used
	29-83362G01	TERMINAL; 2 used

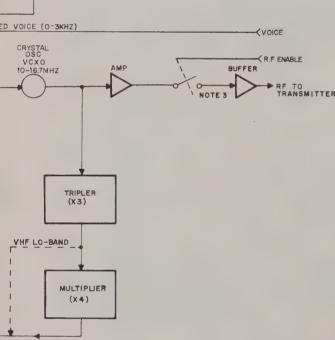
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
(capacitor, fixed:
C101	23-83093G21	2000 uF + 100 - 10%; 100 V
		fuse:
F101	65-475395	1/2 amp: 125 V; slow blow type
		transistor: (see note)
Q3	48-869627	NPN; type M9627
		switch:
S101	40-84241G03	2 position; slide
		transformer:
T101	25-83043L01	pri: #1 BLK-WHT, BLK-GRN; res. 29 ohms
		pri:#2 BLK-YEL, BLK-RED; res 32 ohms sec: BRN, BRN-YEL with BLK center top;
		res. 1 ohm
		terminal board:
TB1	31-120965	4 contact
1		connector, plug:
P101	28-83176L01	male; 3-contact
_	m	echanical parts
	2-119913	NUT, 8-32 × 11/32 × 1/8"; 4 used
	3-122922	SCREW, machine: 6-32 × 5/8"; 2 used
	3-134212	SCREW, tapping: 4-40 × 5/16"; 4 used
	3-134169	SCREW, tapping: 4-40 × 1/4"; 4 used
1	3-135575	SCREW, tapping: 6-32 × 5/16"; 4 used
	3-136934	SCREW, tapping: 6-32 × 38"; 6 used WASHER, shoulder; 4 used
	4-844093 7-83181L01	BRACKET, fuseholder
	7-84139N01	BRACKET, heat sink mounting; 2 used
	9-82083C03	RECEPTACLE, fused
	9-82673A01	SOCKET, transistor, 3 used
	9-83175L01	RECEPTACLE, female; 3 contact
	14-865854	INSULATOR, transistor
	14-84309N01	INSULATOR, paper
	15-83559L01	COVER, transistor
3	26-84212E02	HEAT SINK
,	29-84151L01	TERMINAL, socket; 3 used
	29-847854	LUG, tongue
	29-84150L01	TERMINAL, plug; 3 used
	42-10217A02	STRAP, tie; 10 used
	42-83123F01	RETAINER; 6 used
L.	54-84789L01	LABEL, WARNING
	30-83211C04	CABLE and PLUG AC
	37-107998	SLEEVING
	29-812979	LUG, crimp terminal; 4 used

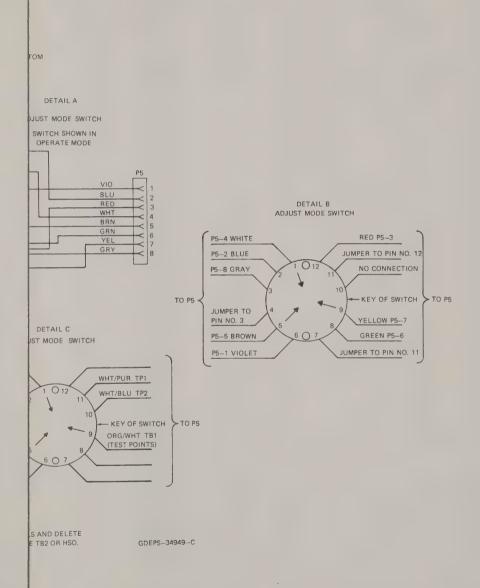
note: For op: imum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

TPN1195A Power Supply Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34988-A 6/3/83 - V & G

INSTANTANEOUS DEVIATION

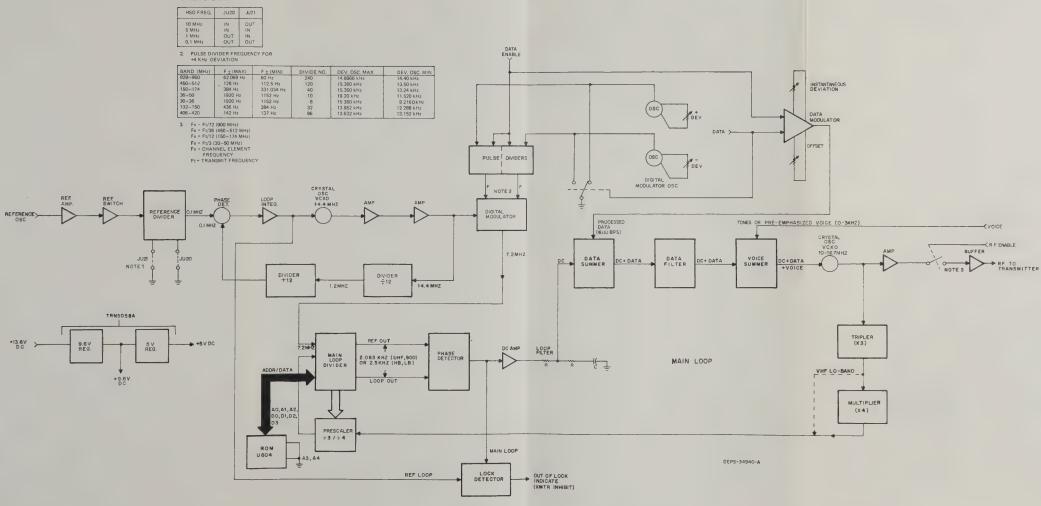




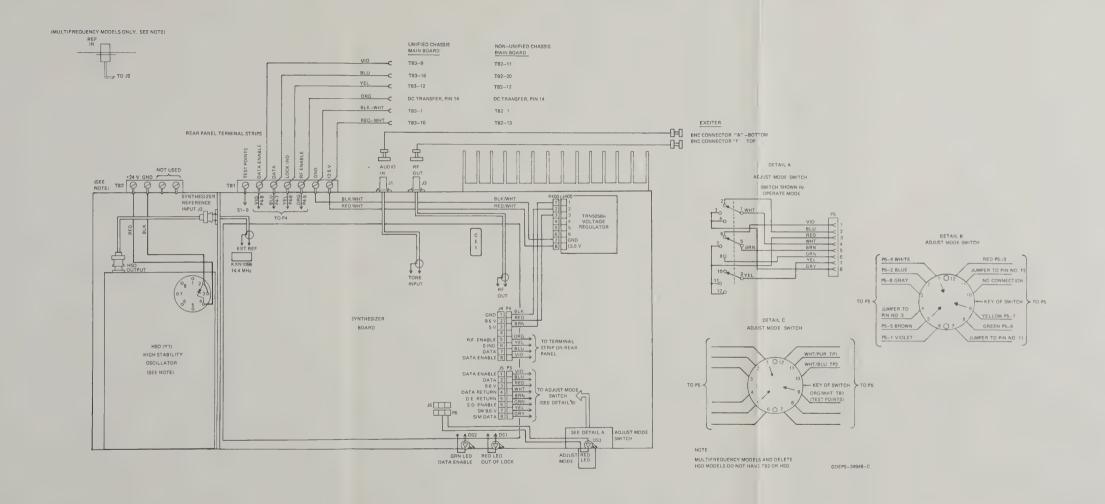


Paging Synthesizer Intercabling Diagram Motorola No. GDEPS-34949-C 9/15/83 - V&G NOTES

1. JUMPER CHART



Paging Synthesizer Block Diagram Motorola No. DEPS-34940-A 6/3/83 - V & G



Paging Synthesizer Intercabling Diagram Motorola No. GDEPS-34949-C 9/15/83 - V&G

THESIZER BOARD



- 1 Unless otherwise indicated resistor values are in ohms, capacito values are in microfarads, and inductor values are in millihenries
- 2 Integrated circuits on this board are TTL & CMOS devices
- 3. IC types and connections for this board are as follows.

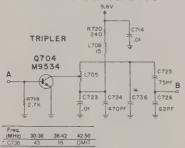
Reference Designation	Туре	VCC	Gnd	Mfgr's Description
U1	71K76	14	7	Dual Timer
U3, 4, 5, 6, 7, 8	84L38	16	8	Presettable - N Counter
U9	61L04	14	7	Quad 2-Input NAND Gate
U10	61L15	14	7	Dual D Flip-Flop
U11	27M11	14	7	Quad 2-Input NAND Gate
U12	48M23	14	7	Quad 2-Input Exclusive OR Gate
U13	61L15	14	7	Dual D Flip-Flop
U14, 15	61L10	5		Decade Counter
U16	71K37	16	8	Dual 4-Input Multiplexer
U17	09M79	14	7	Quad 2 Exclusive OR Gate
U18	91B02			14 4 Osc
U19, 20	61L85	5	6, 7, 10	One - 12 Counter
U21	29M81	4	11	Quad Op Amp
U22	29M32	8	4	Dual Op Amp
U23	84L62	16	8	Programmable Timer
U601	68F68	_	4	- 3 - 4 Prescaler
U602	68F63	10	4	Prog Divider
U603	68F59	18	16	Sample & Hold Phase Det
U604	89L03	16	8	ROM
U606	71K74	_ 3	12	Quad Comparator
U607	71K94	14	7	Quad 2-Input OR Gate
U609	29M32	14	7	Dual Op Amp

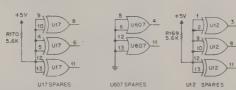
JU21	JU20	External Reference
IN	IN	5 MHz
OUT	IN	10 MHz
EN	OUT	1 MHz
OUT	OUT	100 kHz

5 Set the meter selection switch to position D for multiplier tuning

Band	C8	30		
30-50 M	Hz .00)1		
All Othe	ers 47	pF		
Band				
(MHz)	C42	C43	R25	R26
30-36	4000	4000	9090	9090
36-42	3900	3900	8660	8660
42-50	4700	4700	8450	8450
VHF				
150-174				
UHF	3900	3900	9090	9090
450-512				
900				
UHF	5000	5000	7680	7680
406-420				
VHF	5000	5000	7680	7680
122 150				

- C19A is mounted on solder side of board
 Dashed line is a wire jumper in place for low band operat
- 10 For Low Band, connect this circuit between points. A" & B





12 Foil shields connected to the phase detector output circuit (denoted by dashed lines) surround pins U603-12, 13, and 24 as well as much of the adaptive filter section.

13 JUMPER TABLE

	Jumpers Used •
Low Band — 30-36 MHz	JU5. 7 15. 16 22 24
Low Band - 36-42 MHz	JU6_8_15_16_22_24
Low Band - 42 50 MHz	JU6, 8, 15, 16, 22, 24
High Band - 136-174 MHz	JU3 6 8.9 14 17 23 25
UHF Band - 450-512 MHz	JU1, 4, 6, 8, 10, 11, 13, 18, 23, 25
900 MHz Band	JU2, 3, 4, 6, 8, 10, 12, 13, 18, 23, 25
VHF Band — 132-150 MHz	JU3, 5, 7, 9, 14, 17 23 25
11115 0 1 100 100 1111	1114 4 5 7 7 40 44 40 40 40 40

14 COMPONENT USAGE TABLE

Band	R137	R134	R700	R120	C23	C77	R180
30-50 MHz	30k	15k	2 2k	0	1 uF	47 uF	100k
150-174 MHz	30k	15k	2.2k	11k	1 uF	47 uF	100k
450-512 MHz	68k	15k	2.2k	100k	1 uF	47 uF	100k
928-960 MHz	68k	7 5k	680	100k	0 47 uF	0.1 uF	220k
132-150 MHz	51k	15k	2.2k	11k	1 uF	47 uF	100k
406-420 MHz	68k	15k	2.2k	100k	1 uF	47 uF	100k
Band R7	5 @121	C715	C716	C721	C722	C725	C726
30-50 MHz 100	k 1k	-		_	_	75 pF	62 pF

30-50 MHz 1000 1k 120 P6 20 P100 pF 47 pF 16 pF 11 150-174 MHz 100k 1k 120 pF 62 pF 100 pF 47 pF 16 pF 11 120 pF 62 pF 100 pF 47 pF 16 pF 11 132-150 MHz 100k 1k 150 pF 100 pF 120 pF 68 pF 20 pF 13 132-150 MHz 100k 1k 150 pF 100 pF 120 pF 68 pF 20 pF 13 1406-420 MHz 100k 1k 150 pF 100 pF 120 pF 120 pF 13 1406-420 MHz 100k 1k 150 pF 100 pF 120 pF 120 pF 13 1406-420 MHz 100k 1k 150 pF 100 pF 120 p

Paging Synthesizer Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34989-B (Sheet 2 of 3)

9/15/83 - V&G



RF OUT

METER SOCKET NOTE 5 TLB8502A Synthesizer Board, 30-36 MHz TLB8503A Synthesizer Board, 36-42 MHz

parts list TKN8968A Synthesizer Interconnect Cable REFERENCE MOTOROLA SYMBOL PART NO. DESCRIPTION 48-88245C04 Ilight emitting diode: (see note) 15-83142M07 housing, 8-position 39-82717M01 contact, receptacle; 7 used contact, receptacle; 8 used housing, 3-position contact, receptacle; 2 used housing, 8-position 39-82717M01 contact, receptacle; 5 used 40-84669K01 3-position 31-82272B04 7-screw terminal non-referenced items 1-80757D24 FEED-THRU ASSEMBLY 30-83794C01 CABLE, coaxial: WHT; 5.75" used 3-135941 SCREW, machine: 6-32 x 1/2"; 4 used 42-10217A02 STRAP, tie, 5 used TRN5672A Synthesizer Hardware Kit (900 MHz) REFERENCE MOTOROLA 48-83851N02 CRYSTAL: (TRN5447A only) SCREW, tapping: 4-40 x 5/16": 14 used 41-84811B01 SPRING 42-84284B01 RFTAINER: 14 used NUT, bex: 3/8-32 x 1/2 x 3/32" NUT, hex: 6-32 x 1/4 x 3/32 x 1/8"; 4 used SCREW, machine: 8-32 x 3/8", 6 used SCREW, tapping: 6-32 x 1/4" 6 used 26-83982N01 HEAT SINK 32-83978N01 GASKET 36-82630H01 KNOB, control

note: Y1 not field servicable. Order entire kit if replacement is needed TKN8967A HSO Cable PI -8701-O

REFERENCE MOTOROLA SYMBOL PART NO. non-referenced items 28-83099K01 BNC CONN; 2 used 30-83794C01 CABLE, coax; 5.75°

43-10646A09 STANDOFF; 2 used 48-82525G18 DIODE, silicon

TKN8966A Reference Cable REFERENCE MOTOROLA 9-84968D01 BNC BULK HEAD MOUNT CONNECTOR 28-83099K01 BNC CONNECTOR: 50 ohm 30-83794C01 CABLE. coax 6.5"

Paging Synthesizer Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34989-B (Sheet 1 of 3)

9/26/83-

PL-8700-O TLB8504A Synthesizer Board, 42-55 MHz

2 21-11 3 21-11 5 21-11 5 21-11 5 21-11 5 21-11 5 21-11 5 21-11 6 21-1	PART NO. 11014H32 111015A07 11015A07 11014H32 11015B05 11014H32 11015B05 0077808 11015B07 11	DESCRIPTION Capacitior, lixed: UF = 10%; 100 V: unless otherwise stated 01 + 90.20%, 100 V: 200 pF = 5%, 50 V 220 pF =	REFERENCE SYMBOL 1.3 1.0 1.0 1.0 1.1 1.70 1.70 1.70 1.70 1.7	PART NO.	DESCRIPTION COIL 7E:	REFERNCE SYMBOL 2009 192 1991 32 1993 34 1995 1995 1995 1995 1995 1995 1995 199	PART NO 11009E99 6-11009E95 6-110	DESCRIPTION 2 7h. 4 7k. 2 2k. 5 6k. 1 k. 5 6k. 4 7h. 5 6k. 6 7h. 6 7h. 6 7h. 7 7h. 7 8h.	
21-11 21-11	11014482 11014802 11014802 11015805 110	capacitor, fixed: UF = 10°x; 100 V: unites otherwise stated 20 pF = 5%, 50 V 20 pF = 5%, 50 V 20 pF = 5%, 50 V 20 pF = 5%	13 L8 L9	24.62723H07 24.62723H07 24.62723H07 24.639518D1 24.639518D1 24.62723H07 24.62723H07 24.62723H07 24.62723H07 24.62723H03 24.627	coll, #1 choke, 10 uH choke, 10 uH choke, 10 uH 3 lums 3 lums 3 lums 3 lums 4 l	991 92 92 989 991 992 993 94 995 94 995 997 997 997 997 997 997 997 997 997	6.11009E99 6.11009E96 6.11009E97 6.11009E96 6.11009E96 6.11009E97 6.11009E96	2 7 k 4 7 k 2 2 k 1 2 k 5 1 k 5 1 k 5 1 k 4 7 k 4 7 l 1 k 4 7 l 2 70 1 k 4 7 l 4 7 l 5 8 k 4 7 k 6 8 8 8 9 199 10 2 2 k 10 2 2 k 10 (resistor (umper) 1 l 1 3306	
211113 211113 211113 21113 21113 21113 21113 21113 2113	11014482 11014802 11014802 11015805 110	unless otherwise stated 20 pf = 5%, 50 V	LB LB L9 10 L13	2-4.8(2723407) 2-4.8(choke, 10 uH choke, 15 uH choke, 10 uH choke	R80, 94 R89 R97 R88, 99, 100 R101 R102 R104 R104 R105 R106 R106 R106 R106 R106 R107 R111 R111 R111 R111 R111 R111 R111	6-11009E65 6-11009E57 6-11009E75 6-11009E75 6-11009E66 6-11009E66 6-11009A45 6-11009E45	4 7% 2 2k	
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5 21-11-15 5 21-11-15 6 21-15 6 21-15 7 21-15	11015805 2217844 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	220 o F 1000 o F 220 b F 220 b F 220 b F 220 b F 220 b F 230 b F 230 b F 240 b F 240 b F 250 b F 25	L/01 L/02 L/03 L/03 L/03 L/09 L/10 O1 O2 O3.4.5 O9.10,11,12 O19.20,21 O19.20,21 O22 O23.24 O25 O30 O31 O30 O30 O31 O30 O31 O30 O31 O30 O31 O30 O30 O31 O30 O30 O31 O30 O30 O30 O31 O30 O30 O31 O30 O30 O31 O30	24-82723H07 24-80900A61 24-84972A15 24-82749D09 24-82723H03 24-82723H03 24-82723H03 24-82723H03 48-869843 48-869843 48-869844 48-869844 48-869844 48-869844 48-869847 48-869847 48-869849	Choke, 10 uH Ch	R98, 99, 100 R103 R103 R105 R105 R105 R106 R107, 108 R109 R107, 108 R109 R111 R111 R111 R111 R111 R111 R111	6-11099866 6-110998467 6-110998465 6-110098495 6-110098495 6-110098465	5 1k 5 6k 1770 178 178 4 7k 4 7k 4 7k 6 76 680 150 150 10 2 7k 2 7k 10 10 10 10 10 10 10 10 10 10 10 10 10	
5 2188 2189 2189 2189 2189 2189 2189 2189	82.187844 11014H12 11014H12 11015H05 11015H07 11	1000 pF 2 9%, 50 V 200 F 2 9%, 50 V 200	L702 L705 L708 L708 L709 L710 Q1 Q3, 4, 5 Q3, 10, 11, 12 Q13 Q14, 12, 12 Q22 Q25 Q25 Q33, 34 Q33, 34 Q33, 34 Q33, 34 Q33, 34 Q33, 34 Q34 Q34 Q35 Q35 Q36 Q37 Q37 Q37 Q37 Q37 Q37 Q37 Q37 Q37 Q37	24 B0900A61 24-84972A15 24-84972A15 24-82723H07 24-82723H07 24-82723H07 24-82723H03 48-869642	choice, 0.62 Lift variable, 4-1/12 (urins (RED), 30-50 MHz choles, 13 uts (30-50 MHz) choles, 13 uts (30-50 MHz) choles, 23 uts (14 uts (30-50 MHz) translation; (see note) PRIP: type M9643 PRIP: type M9644	R101 R103 R104 R105 R106 R106 R106 R107 R107 R110 R111 R110 R111 R114 R115 R115 R116 R116 R116 R116 R116 R116	6-11/09/449 6-11/09/449 6-11/09/449 6-11/09/449 6-11/09/46 6-11/09	1k. 270 470 470 470 564 470 564 180 190 280 280 270 270 270 100 (Creastor jumper) 11 11 200 308	
9 21.11.1 9 1 21.11.1 10 21.11.1 11 21.11.1 11 2 21.11.1	110144132 11016805 11016805 11015805 11015816 11015816 1017817 1017817 1017807	20 F ± 54%, 50 V 22 Oz h 54%,	L708 L708 L709 L710 O1 Q2 Q3, 4, 5 Q9, 10, 11, 12 Q11 hru 18 Q19, 20, 21 Q22 Q22 24 Q25 Q33, 34 Q33, 34 Q35 Q37 Q37 Q38, 39 Q41 Q41 Q41 Q41 Q41 Q41 Q41 Q41 Q41 Q41	24-84972A 15 24-82549D09 24-82723H07 24-82723H03 24-82723H03 48-869841 48-869842 48-869842 48-869842 48-869843	variable, 4-1/2 (urns (RED.), 39-30 MHz chole, 10 uH chole, 10 uH chole, 10 uH chole, 10 uH transition (see note) PME; type M9548 PME; type M9548 NPN, type M9642 NPN; type M9643 NPN; type M9644 NPN; type M9644 NPN; type M9645	R103 R104 R105 R104 R105 R106 R107, 108 R107, 108 R107, 108 R111 R1112 R1113 R1114 R1115 R119 R120 R112 R112 R112 R112 R112 R112 R112	8-11099.45 8-11099.45 8-11099.45 8-11099.45 8-11099.45 8-11099.45 8-11099.45 8-11099.45 8-11099.43 8-11099.43 8-11099.43 8-11099.43 8-11099.43 8-11099.45 8-1109	270 1k 4.7k 4.70 6.6k 6.7k 6.80 150 150 150 10 2.7k 10k 10k 10k 10k 10k 10k 10k 10k 10k 10	
9 0 21-11-12 9 1	11015805 1017817 101781 101781 101781 1017817 1017817 1017817 1017817 1017817 1017817 1017817 1017817 1017817	220 pF 10 1:50 V 10 V 1	L708 L709 L710 Q1 Q2 Q3 4.5, 11, 12 Q3 4.0, 11, 12 Q3 4.0, 11, 12 Q2 24 Q3 Q2 Q2 24 Q3 33 34 Q3 35 Q3 Q2 Q3 33 35 Q3 Q2 Q3 Q3 34 Q3 Q2 Q3 Q3 Q3 Q3 Q3 Q4 Q3 Q4 Q3 Q4 Q4 Q4 Q4 Q4 Q4 Q4 Q4 Q4 Q4 Q4 Q4 Q4 Q4 Q4 Q4 Q4 Q4 Q4 Q	24.827.349D09 24.827.231407 24.827.231407 24.827.231403 48.869.643 48.869.642 48.869.642 48.869.642 48.869.642 48.869.642 48.869.642 48.869.642 48.869.642 48.869.642 48.869.642 48.869.643 48.869.643 48.869.643 48.869.643 48.869.643 48.869.643 48.869.643 48.869.643 48.869.643 48.869.643 48.869.643 48.869.643 48.869.643 48.869.643 48.869.643 48.869.643	choke, 19 ut (30-50 MHz) choke, 20 ut 1 choke, 20 u	R104 R105 R106 R106 R106 R106 R107 R110 R110 R110 R110 R110 R1114 R116 R116 R116 R117 R116 R117 R116 R117 R116 R117 R116 R117 R120 R120 R120 R120 R120 R120 R120 R120	6.11/09/A48 6.11/09/A45 6.11/09/A45 6.11/09/A45 6.11/09/A47 6.11/09/A47 6.11/09/A47 6.11/09/A47 6.11/09/A47 6.11/09/A47 6.11/09/A47 6.11/09/A47 6.11/09/A47 6.11/09/A47 6.11/09/A47 6.11/09/A47 6.11/09/A47 6.11/09/E47	1h, 470 470 670 680 680 690 990 990 990 990 990 990 990 990 99	
10 5-11 11 12 12 13 13 13 13	10.1/817 (10.10317) (10.10317) (10.10317) (10.10317) (10.10318) (1	0 1.50 V 056,35 V 01.50 V 01.5	1/09 L710 O1 O2 O3, 4, 5 O9, 10, 11, 12 O13 thu 18 O12, 20, 21 O22 O25 O30 O31, 34 O31, 34 O31, 34 O41 O41 O41 O41 O41 O41 O41 O41 O41 O4	24-82723H07 24-82723H03 48-895548 48-895643 48-895643 48-895643 48-895643 48-895643 48-895644 48-895644 48-895644 48-895647 48-895647 48-895647 48-895647 48-895648 48-895648 48-895648 48-895648 48-895648 48-895648 48-895648 48-895648 48-895648 48-895648 48-895648 48-895648 48-895648	choke, 10 uH translator (see mole) PMP: Type M9648 PNP: Type M9644 PNP: Type M9644 PNP: Type M9644 PNP: Type M9642 NPN: Type M9647 PNP: Type M9648 NPN: Type M9648 PNP: Type M9648 PNP: Type M9648 PNP: Type M9648 NPN: Type M9648	R105 R106 R107,108 R109 R109 R111 R1112 R1114 R1114 R115 R116 R117,118 R119 R120 R122 R122 R122 R122 R122 R122 R122	8-11009465 6-11009441 6-11009467 8-11009465 8-11009465 8-11009429 6-11009429 6-11009429 6-11009429 6-11009409 6-1100949 6-1100949 6-1100949 6-1100949 6-1100949 6-1100969 8-1100969 6-1100969 8-1100969	4 7% 4 70 5 6 % 6 80 150 210 220 22 % 5 6 % 100 100 100 100 100 100 100 100 100 10	
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3.3 & \$11(1.4 c) \$1.4	1017817 (1017817 (1015847 (101	0 1.50 V - 0.1 ** 0 1.50 0.0 ** 0 1.50 0.0 ** 0 1.50 0.0 ** 0 1.50 0.0 ** 0 1.50 0.0 ** 0 1.50 0.0 ** 0 1.50 0.0 ** 1 0.50 0.0 ** 1	Q2 4,5 Q9,10,11,12 Q13,45 Q9,10,11,12 Q13 Q14,14 lhru 18 Q19,20,21 Q22 Q23 24 Q25 Q26 Q33 32 Q33,34 35 Q33,34 35 Q34 Q41 42 Q44 Q701 Q704	48-869548 48-869843 48-869842 48-869842 48-869843 48-869843 48-869842 48-869842 48-869842 48-869842 48-869842 48-869842 48-869843 48-869843 48-869843 48-869843 48-869843 48-869843 48-869843 48-869843 48-869843 48-869843	Harmastur: rese metel PREP 170 a MS-6640 PRIP 170 b MS-6640 PRIP 170 b MS-6640 PRIP 170 b MS-6640 RPIN 170 b MS-66400 RPIN 170 b MS-66400 RPIN 170 b MS-66400 RPIN 170 b MS-66400 RPIN 1	R107, 108 R109 R110 R1111 R1112 R1113 R1114 R1115 R1116 R1116 R117, 118 R117, 118 R122 R122 R122 R122 R122 R122 R122 R	6-11/09/467 5-11/09/465 6-11/09/465 6-11/09/469	5 6 k 4 7 k 680 150 310 20 20 27 k 5 6 k 10k 10k 10k 10k 10k 10k 10k 10	
14 21.11.14.14.14.14.14.14.14.14.14.14.14.14	11015A07 11015B05 11015A07 11015A07 11015A07 11015B05 11015B05 11015B05 1017B06 1017B0	01 + 80-20% 200 # = 5%	Q2 4,5 Q9,10,11,12 Q13,45 Q9,10,11,12 Q13 Q14,14 lhru 18 Q19,20,21 Q22 Q23 24 Q25 Q26 Q33 32 Q33,34 35 Q33,34 35 Q34 Q41 42 Q44 Q701 Q704	48.869643 48.869642 48.869642 48.869643 48.869643 48.869642 48.869547 48.869642 48.869643 48.869643 48.869642 48.869642 48.869642 48.869643 48.869643 48.869643 48.869643 48.869643 48.869643 48.869643 48.869643	PINET, type M9544 PINET, type M9642 NPN, type M9644	R110 R1111 R1112 R1113 R1114 R1115 R1116 R1116 R1119 R120 R120 R121 R122 R122 R122 R122 R122	6-11009A65 6-11009A29 6-11009A29 6-11009A29 6-11009A33 6-11009A33 6-11009A56 6-11009A57 6-11009A57 6-11009E27 6-11009E27 6-11009E27 6-11009E27 6-11009E27 6-11009E27 6-11009A89 6-11009A89 6-11009A89 6-11009A89 6-11009A89	680 150 390 20 20 27 k 5 6k 11k 10k 0 (resistor jumper) 330k 339k	
15 2-1-1-1 15 2-1-1-1 15 2-1-1-1 16 16 2-1-1-1 16 16 2-1-1-1 16 16 2-1-1-1 16 16 2-1-1-1 16 16 2-1-1-1 16 16 2-1-1-1 16 16 2-1-1-1 16 2-1-1-1 16 2-1-1-1	11015805 11015805 11015807 11015807 11015807 11015807 11017807 1017807	220 pF = 5% 01 = 90.20% 0088 x 90.70 V 0088 x 90.70 V 100 pF 5% 0047,50 V 100 pF 5% 0047,50 V 1.55 V	Q2 4,5 Q9,10,11,12 Q13,45 Q9,10,11,12 Q13 Q14,14 lhru 18 Q19,20,21 Q22 Q23 24 Q25 Q26 Q33 32 Q33,34 35 Q33,34 35 Q34 Q41 42 Q44 Q701 Q704	48.869643 48.869642 48.869642 48.869643 48.869643 48.869642 48.869547 48.869642 48.869643 48.869643 48.869642 48.869642 48.869642 48.869643 48.869643 48.869643 48.869643 48.869643 48.869643 48.869643 48.869643	NPN, type M9642 NPN, type M9642 NPN, type M9643 NPN, type M9643 NPN, type M9643 NPN, type M9642 NPN, type M9642 NPN, type M9642 NPN, type M9642 NPN, type M9643 NPN, type M9644	R111 R112 R113 R114 R115 R116 R117, 118 R119 R120 R121 R122 R122 R123 R125 126 R127 R127 R128	6-11009A29 6-11009A33 6-11009A33 6-11009A03 6-11009A56 6-11009A56 6-11009E49 6-11009E49 6-11009E23 6-11009E49 6-11009E87 6-11009A73	150 390 220 10 2k 5 6k 10 10 6 6 10 10 10 3 6 10 10 10 3 7 10 10 3 300 3 8	
166	11015A07 11017B07 11013D55 84538G06 11015B01 0027B08 1017B01 0027B08 1017B01 0026B04 11015A07	01 + 80.20% 1008 400 V 20	G3. 4, 5 G9. 10, 11, 12 G13. G14 lihru 18 G19, 20, 21 G22 G22, 24 G25 G30 G31 32 G33, 34 35 G37 G38, 39 G41 42 G43 G701 G701	49-869642 48-869643 48-869643 48-869642 48-869642 48-869642 48-869642 48-869642 48-869642 48-869642 48-869642 48-869642 48-869642 48-869642 48-869642 48-869642	NPN, type M9642 NPN, type M9642 NPN, type M9643 NPN, type M9643 NPN, type M9643 NPN, type M9642 NPN, type M9642 NPN, type M9642 NPN, type M9642 NPN, type M9643 NPN, type M9644	R112 R113 R114 R115 R116 R116A R117, 118 R119 R120 R121 R122 R123 R125 126 R127 R127 R128	6-11009A39 6-11009A33 6-11009A01 6-11009A56 6-11009A59 6-11009A67 6-11009E49 6-11009E73 6-11009E49 6-11009E87 6-11009B87 6-11009A89 6-11009A73	390 220 10 2k 2 7k 6 6k 1k 10(0 (resistor jumper) 1k 330%	
77	1017B07 11013D55 84538G06 11015B01 0027B08 1017B06 1017B06 4553G14 0026B04 11015B01 0026B04 11015B01 0026B04 86339G 86339G 86339G 86339G 1017A06 11015B01 1017A06 1017A06 1017A06 1017A06 86339G 1017A06 1017A06 86339G	0088 19V 47 20V 27 27 20V 20V	Q9, 10, 11, 12 Q13 Q14 Ihru 18 Q19, 20, 21 Q2 Q2 Q2 Q2 Q2 Q2 Q3 Q3 Q3 Q3 Q3 Q3 Q3 Q3 Q3 Q4 Q4 Q4 Q4 Q43 Q701 Q704	48 869642 48 869643 48 869642 48 869570 48 869542 48 869542 48 869643 48 869642 48 869642 48 869642 48 869644 48 869644 48 869647 48 869647 48 869647 48 869647 48 869647 48 869642	NPN, type M9642 PNP: type M9642 NPN: type M9642 NPN: type M9642 NPN: type M9642 NPN: type M9670 NPN: type M9670 NPN: type M9670 NPN: type M9642 NPN: type M9643 NPN: type M9642 NPN: type M9643 NPN: type M9643 NPN: type M9643 NPN: type M9647 NPN: type M9644	R113 R114 R115 R116A R117, 118 R119 R120 R121 R122 R123 R125 126 R127 R128	6-11009A33 6-11009A01 6-11009A56 6-11009A59 6-11009E49 6-11009E43 6-11009E23 6-11009E49 6-11009E87 6-11009A73	220 10 2k 5 6k 1k 10k 0 (trasistor jumper) 1k 330k 98k	
18	11013055 84538G06 11015801 0027808 1017806 1017801 1017801 84538G14 0026804 84538G14 10015A07 11015A07 11015A07 11015A07 11017A06 863396 82537849 1017A06 863396 82537849 1017A06 11015A07 11015A07 84538G04 11015A07 84538G04	2 1 ± 20 W 20 V 2 V 2 V 2 V 2 V 2 V 2 V 2 V 2 V 2	013	49.869842 48.869642 48.869642 48.869570 48.869642 48.869642 48.869642 48.869643 48.869642 48.869570 48.869570 48.869570 48.869570 48.869642	P.NIE-1 you M9843 NPN: 1 you M9842 NPN: 1 you M9842 NPN: 1 you M9842 NPN: 1 you M9842 NPN: 1 you M9843 NPN: 1 you M9844	R114 R115 R116 R116A R117, 118 R119 R120 R121 R122 R123 R125 126 R127 R128	6-11009A01 6-11009A59 6-11009A59 6-11009A67 6-11009E49 6-11009E43 6-11009E49 6-11009E87 6-11009E87 6-11009A73	10 2k 27k 5 6k 1k 10k 0 (resistor jumper) 1k 330k 398	
1994 21-11-10 10 Beddon	84538G06 11015B01 0027B08 1017B06 1017B06 1017B06 84538G14 0026B04 11015A07 11015B01 0026B04 853396 82537B49 1017A06 853396 82537B49 1017A06 11015A07 11015A07 11015A07 84538G04	47 ~ 70% 20 V 100 p ² 50 047,50 V 001,50 V 11.35 V 01 + 80.20% 50 09F ± 1%,50 V (80.38 MHz) 50 09F ± 1%,50 V (80.38 MHz) 60 09F ± 1%,50 V (80.38 MHz)	O14 Ihru 18 O19, 20, 21 O22 O23 24 O25 O30 O31 32 O33, 34 35 O36 O37 O38, 39 O40 O41 42 O43 O701 O704	48.869642 48.869570 48.869642 48.869543 48.869643 48.869642 48.869642 48.869570 48.869570 48.869570 48.869570 48.869570 48.869570 48.869570 48.869570 48.869542	NPN: type M9642 NPN: type M9643 NPN: type M9644 NPN: type M9644 NPN: type M9644	R115 R116 R116A R117, 118 R119 R120 R121 R122 R123 R125 126 R127 R128	8-11009A56 6-11009A59 6-11009A67 6-11009E49 6-11009E49 6-11009E49 8-11009E49 6-11009E87 6-11009A89 6-11009A73	2k 27k 5 6k 1k 10k 0 (resistor jumper) 1k 330k 39k	
00 68000 00 6000 00 6000 00 6000 00 6000 00 6000 00	11015B01 0027B08 1017B06 1017B01 1017B01 84538G14 0026B04 11015A07 11015B01 0026B04 883396 883396 882537B49 1017A06 1017A06 11015A07 11014H44 11015A07 11015A07 885396	100 pF 9- 100 pF 9- 100 pF 9- 100 pF 9- 101 50 V 102 F0 F0 V 102 F0 F0 SP SP V 102 F0 SP SP SP V 102 F0 SP SP V 103 F0 SP SP V 104 F0 SP SP SP V 105 F0 SP SP SP V 105 F0 SP SP SP SP V 105 F0 SP	019, 20, 21 022 023 24 025 026 030 031 32 033, 34 35 036 037 038, 39 040 041 42 043 0701 0704	48 869642 48 869543 48 869643 48 869642 48 869642 48 869642 48 869570 48 869570 48 869570 48 869642 48 869543 48 869642	NPN: type M9570 NPN: type M9542 NPN: type M9570 PNP: type M9570 PNP: type M9642 NPN: type M9642 NPN: type M9642 NPN: type M9642 NPN: type M9571 NPN: type M9571 NPN: type M9571 NPN: type M9571 NPN: type M9571 NPN: type M9571	R116 R116A R117, 118 R119 R120 R121 R122 R123 R125 126 R127 R128	6-11009A59 6-11009A67 6-11009E49 6-11009E73 6-11009E49 6-11009E49 6-11009E87 6-11009A89 6-11009A73	5 6k 1k 10k 0 (resistor jumper) 1k 330k 39k	
8-11 8-11 8-11 8-11 8-11 8-11 8-11 8-11	1017806 1017801 84538G14 10026B04 11015A07 11015B01 0026B04 863396 863396 82537849 1017A06 862396 1017A06 1015A07 11015A07 11015A07 11015A07 84538G04 11015A07 88537C09 88537C09	0047,50 V 011,50 V 11,35 V 101 + 80,20% 100 pF 100 pF 10	O25 O26 O30 O31 32 O33, 34 35 O36 O37 O38, 39 O40 O41 42 O43 O701	48 869570 48 869642 48 869642 48 869642 48 869643 48 869570 48 869571 48 869570 48 869570 48 869642 48 869643 48 869643	NPN. type M9642 NPN: type M9570 PNP: type M9643 NPN: type M9642 NPN: type M9642 NPN: type M9643 NPN: type M9643 NPN: type M9570 PNP: type M9571 NPN: type M9571 NPN: type M9642	R117, 118 R119 R120 R121 R122 R123 R125 126 R127 R128	6-11009A67 6-11009E49 6-11009E73 6-11009E49 6-11009E49 6-11009E87 6-11009A89 6-11009A73	1k 10k 0 (resistor jumper) 1k 330k 39k	
22	1017B01 84538G14 10026B04 11015A07 11015B01 0026B04 863396 82537B49 1017A06 883396 82537B49 1017A06 11015A07 11015A07 84538G04 11015A07 84538G04	001,50 V 1,35 V 5,50 V 5,50 V 100 F 5,50 V 100 F 100 F 10	O25 O26 O30 O31 32 O33, 34 35 O36 O37 O38, 39 O40 O41 42 O43 O701	48 869642 48 869642 48 869642 48 869643 48 869570 48 869571 48 869571 48 869642 48 869643 48 869643	PNP: type M9643 NPN, type M9642 NPN; type M9642 PNP: type M9643 NPN; type M9643 NPN; type M9570 PNP: type M9571 NPN; type M9571 NPN; type M9642	R119 R120 R121 R122 R123 R125 126 R127 R128	6-11009E73 6-11009E23 6-11009E49 6-11009E87 6-11009A89 6-11009A73	10k 0 (resistor jumper) 1k 330k 39k	
23 23 23 24 24 25 25 25 25 25 25 25 25 25 25 25 25 25	84538G14 0026B04 11015A07 11015B01 0026B04 863396 863396 82537849 1017A06 82537849 11015A07 11015A07 11015A07 11015A07 38538G04 11015A07 88538G04	1:35 V 5:00 80 20% 100 pF 100 pF 1	Q26 Q30 Q31 32 Q33, 34 35 Q36 Q37 Q38, 39 Q40 Q41 42 Q43 Q701 Q704	48.869642 48.869643 48.869643 48.869642 48.869571 48.869571 48.869642 48.869643 48.869642	NPN, type M9642 NPN, type M9642 PNP, type M9643 NPN, type M9642 NPN, type M9670 PNP, type M9571 NPN, type M9642	R120 R121 R122 R123 R125 126 R127 R128	6-11009F23 6-11009E49 6-11009F10 6-11009E87 6-11009A89 6-11009A73	0 (resistor jumper) 1k 330k 39k	
24	0026804 11015A07 11015B01 0026804 863396 863396 882537849 1017A06 863396 11017A06 11017A06 11017A06 11017A07 11017A07 11017A07 82372C09 82372C09	5.50 V 01 + 80.20% 100 pF 100 pF 1	Q30 Q31 32 Q33, 34 35 Q36 Q37 Q38, 39 Q40 Q41 42 Q43 Q701 Q704	48 869642 48 869643 48 869642 48 869570 48 869571 48 869642 48 869643 48 869642	NPN, type M9642 PNP; type M9643 NPN, type M9642 NPN; type M9570 PNP, type M9571 NPN, type M9642	R121 R122 R123 R125 126 R127 R128	6-11009E49 6-11009E10 6-11009E87 6-11009A89 6-11009A73	1k 330k 39k	
66 21-11-77 21-77 21-	11015A07 11015B01 10026B04 863396 883396 882537849 1017A06 883396 82537849 1017A06 11015A07 41015A07 84538G04 11015A07 82372C09 82372C09	01 + 80.20% (100 pF 5.50 V (30.36 MHz) 5.50 V (30.3	O31 32 O33, 34 35 O36 O37 O38, 39 O40 O41 42 O43 O701 O704	48 669643 48 669642 48 669570 48 669571 48 6696742 48 669570 48 669643 48 669642	PNP, type M9643 NPN, type M9642 NPN; type M9570 PNP, type M9571 NPN, type M9642	R122 R123 R125 126 R127 R128	6-11009F10 6-11009E87 6-11009A89 6-11009A73	330k 39k	
177 21-11-17 21-11-18 21	11015801 0026804 863396 82537849 1017A06 863396 82537849 1017A06 11015A07 11015A07 11015A07 84538G04 11015A07 82372C09 824538G04	100 p F 5,0 0 p = 1%, 50 0 V (20.38 MHz) 5,0 0 p = 1%, 50 0 V (20.38 MHz) 3900 p E = 1%, 684,22 MHz) 4000 p E = 1%, 50 0 V (20.38 MHz) 4000 p E = 1%, 50 0 V (20.38 MHz) 6000 p E = 1%, 50 0 V (20.38 MHz) 6000 p E = 1%, 50 0 V (42.50 MHz) 61 + 80,20 %, 50 V (42.50 MHz) 61 + 80,20 %, 50 V (42.50 MHz) 61 + 80,20 %, 50 V (42.50 MHz)	O33, 34 35 O36 O37 O38, 39 O40 O41 42 O43 O701 O704	48-869570 48-869570 48-869571 48-869570 48-869570 48-869643 48-869642	NPN, type M9642 NPN; type M9570 PNP, type M9571 NPN, type M9642	R123 R125 126 R127 R128	6-11009E87 6-11009A89 6-11009A73	39k	
22 2188 22 218	863396 82537849 1017A06 863396 82537849 1017A06 11015A07 11014H44 11015A07 84538G04 11015A07 84538G04	4000 pF = 11%; 500 V (30 38 MHz) 9900 pF = 11%; 6424 MHz) 4700 pF = 5%; 50 V (42 50 MHz) 4700 pF = 5%; 50 V (42 50 MHz) 9900 pF = 11%; 63642 MHz) 9100 pF = 11%; 63642 MHz) 91 = 90 20%; 91 = 90 20%; 91 = 90 20%; 91 = 90 20%; 91 + 90 20%; 91 + 90 20%;	O37 O38, 39 O40 O41 42 O43 O701 O704	48 869570 48-869571 48 869642 48-869570 48-869643 48-869642	NPN; type M9570 PNP, type M9571 NPN, type M9642	R127 R128	6-11009A73	47k	
2188 2188 2188 2188 2188 2188 2188 2188	82537B49 1017A06 11015A07 11014H44 11015A07 8453BG04 11015A07 82372C09 8453BG04	3900 pF ± 1% (36-42 MHz) 4700 pF ± 5%; 50 V (42-50 MHz) 01 ± 80-20% 01 ± 80-20% 01 ± 80-20%	Q38, 39 Q40 Q41 42 Q43 Q701 Q704	48 869642 48-869570 48-869643 48-869642	NPN, type M9642	R128	6-11009A73		
13 2 18 18 19 19 19 19 19 19 19 19 19 19 19 19 19	82537B49 1017A06 11015A07 11014H44 11015A07 8453BG04 11015A07 82372C09 8453BG04	3900 pF ± 1% (36-42 MHz) 4700 pF ± 5%; 50 V (42-50 MHz) 01 ± 80-20% 01 ± 80-20% 01 ± 80-20%	Q40 Q41 42 Q43 Q701 Q704	48-869570 48-869643 48-869642	NPN, type M9642 NPN, type M9570	R128		10k	
13 21 8 21 8 21 8 21 8 21 8 21 8 21 8 21	82537B49 1017A06 11015A07 11014H44 11015A07 8453BG04 11015A07 82372C09 8453BG04	3900 pF ± 1% (36-42 MHz) 4700 pF ± 5%; 50 V (42-50 MHz) 01 ± 80-20% 01 ± 80-20% 01 ± 80-20%	Q41 42 Q43 Q701 Q704	48-869643 48-869642	NPN, type M9570		6-11009A89	47k	
218.1 24 45 21.1 25 41 45 21.1 26 41 45 21.1 27 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 28.8 28 41 42 42 42 43 43 43 43 43 43 43 43 43 43 43 43 43	82537B49 1017A06 11015A07 11014H44 11015A07 8453BG04 11015A07 82372C09 8453BG04	3900 pF ± 1% (36-42 MHz) 4700 pF ± 5%; 50 V (42-50 MHz) 01 ± 80-20% 01 ± 80-20% 01 ± 80-20%	Q43 Q701 Q704	48-869642		R129 R130	6-11009A73	10k 47k	
14 45 8-111 14 45 21-1 15 14 14 5 21-1 17 14 14 15 21-1 17 14 16 16 16 16 16 16 16 16 16 16 16 16 16	1017A06 11015A07 11014H44 11015A07 8453BG04 11015A07 82372C09 8453BG04	4700 pF ± 5%; 50 V (42:50 MHz) 01 + 80:20% 62 pF ± 5% 01 + 80:20% 01 + 80:20%	Q701 Q704		PNP; type M9643 NPN, type M9642	R131, 132	6-11009A89 6-11009A73	47K 10k	
14 45 21-1 14 14 15 21-1 15 14 14 17 15 21-1 16 17 17 17 17 17 17 17 17 17 17 17 17 17	11015A07 11014H44 11015A07 8453BG04 11015A07 82372C09 8453BG04	01 + 80-20% 62 pF ± 5% 01 + 80-20% 01 + 80-20% 01 + 80-20%	Q704	48 869570	NPN, 1998 M9570	R133	6-11009B14	470k	
HB 21-1 3 dathru 56 21-	11014H44 11015A07 8453BG04 11015A07 82372C09 8453BG04	62 pF ± 5% 01 + 80-20% 01 + 80-20% 01 + 80-20%	Q706	48-869534	NPN Type M9534	R134 thru 136	6-11009A77	15k	
77 228. Salthrus 60 221. Salthrus 60 221. Salthrus 60 221. Salthrus 62 228. Salthrus 62 228. Salthrus 63 221. The first 73 228. The first 73 228. The first 73 228. The first 74 228. The first	-84538G04 -11015A07 -82372C09 -84538G04	01 + 80-20% 01 + 80-20%		48-869570	NPN, type M9570	R137	6-11009A84	30k	
Seithwid	11015A07 82372C09 84538G04	01 + 80-20%				R138	6-11009A77	15k	
33	82372C09 84538G04	01 + 80-20% 0.1 + 80-20% - 25 V			resistor, fixed: ±5%; 1/4 W:	R139	6-11009A91	56k	
33	84538G04		R9	0	unless otherwise stated 100	R140 R141	6-11009A99	120k 5.6k	
		0.1 + 80-20%, 25 V	R10	6-11009A25 6-11009A49	160 1k	R142	6-11009A67 6-11009A44	5 5k 620	
70 Intro 73 21.1 6.33 75 8.33 75 8.33 75 21.8 77 22.8 77 23.8 78 21.1 80 8.21 81 32 82 83 21.1 84 22.8 83 23.8 84 23.8 84 23.8 84 23.8 85 86 23.8 86 811 87 21.1		.01 + 80-20%	RII	6-11009A97	100k	B143	6-11009A87	39k	
74 8.833 75 8.633 76 21:8 77 23-8 78 79 21:1 30 8:11 31 8.821 32 83 21:1 34 23-8 37 88 23 8 39 21:1 31 21:1 31 21:1 31 23:8 31 23:8 39 21:1 31 21:1 31 21:1 31 21:1 31 21:1 32 38 38 38 38 38 38 38 38 38 38 38 38 38	11013D55	47 ± 20%, 20 V	R12	6-11009A81	22k	B146	6-11009A65	4 7k	
75 8-833 76 21-8 77 23-8 78 79 21-1 80 8-11 80 8-11 81 8-82 82 83 21-1 84 23-8 84 23-8 92 21-1 91 21-1 92 23-8	11015A07	01 + 80-20%	R13 14	6-11009A67	5 6k	B147	6-11009A59	2 7k	
76 21:8. 77 23:8. 78 79 21:1. 31 8-11! 31 8-22:1. 32 83 21:1. 34 23:8. 35 86 21:8. 37 88 23:8. 39 21:1. 31 21:1. 31 23:8. 34 95 21:1. 36 8:11 37 21:1.	13813H23	068 + 5% + 50 V	R15	6-11009A55	1 8k	R148	6-11009A89	47k	
77 23-8 78 79 21-1 20 8-11 31 882: 22 83 21-1 34 23-8 35 86 21-8 37 88 23-8 39 21-1 30 23-8 30 21-1 31 23-8 39 21-1 30 23-8 31 21-1 31 32-3 31 33-3 31 33-3	84426B48	0068 ± 5°; 665 pF ± 5%; 500 V	R16 R17	6-11009A61 6-11009A57	3 3k	R149 R150	6 11009A19 6 11009E73	56 10k	
78 79 21.1 31 8-11 31 8-22 32 83 21.1 32 83 21.1 34 23-8 35 86 21.8 39 21.1 31 21.1 31 23-8 34 95 21.1 36 8-11 37 28 21.1	84538G29	47 ± 20%, 10 V	R18	6-11009A87	2 2k 39k	R151	6-11009E73	10k	
30 8-111 8-82; 12-83 21-1; 134 23-8; 135-86 21-8; 137-88 23-8; 131-33 23-8; 131-34-95 21-1; 136 8-111, 137 21-1; 136 8-111, 137 21-1; 136 23-8; 137-23-8; 13	-11015A07	01 + 80-20%	R19	6-11009A57	2 2k	R152	6-11009E01	10	
31 882: 32 83 21-1: 34 23-6: 35 86 21-8: 37 88 23-6: 39 21-1: 30 23-8: 30 23-8: 31 21-1: 30 23-8: 31 23-1: 32 21-1: 33 23-8: 34 95 21-1: 36 8-111: 37 21-1: 38 23-8: 39 21-1: 30 23-8: 30 2	1017B01	001, 50 V (30-50 MHz)	R20 21	6-11009A49	1k	R153	6-11009E49	16	
32 83 21-11 34 23-8 35 86 21-8 37 88 23 8 39 21-11 30 21-11 31 21-11 32 23-8 34 95 21-11 36 8-111 37 21-11 37 21-11		047 ± 5%, 50 V	R22	6-11009A73	10k	R154	6-11009E23	82	
35 86 21-8 37 88 23 8-3 39 21-1 91 21-1 93 23-8 94 95 21-1 96 8-111 97 21-1	11015A07	01 + 80-20%	R23	6-11009E81	22k	R155	6-11009E71	8 2k	
39 21-11 91 21-11 93 23-8 94 95 21-11 96 8-111 97 21-11		47 - 20° 10 V 10 pF ± 5° 500 V	R24	6-11009A37	330	R156	6-11009E67	5 6k	
39 21-11 91 21-11 93 23-8 94 95 21-11 96 8-111 97 21-11	84494B29 84538G29	10 pF ± 5% 500 V 47 ± 20%, 10 V	R25	6-84376L15 6-84376L14	9090 ± 0 5% (30-36 MHz) 8660 ± 0 5% (36-42 MHz)	R157 R158	6-11009C18 6-11009F73	51 10k	
91 21-1 93 23-8 94 95 21-1 96 8-11 97 21-1 200 23-8	11015A07	.01 + 80-20%		6-84376L14 6-84376L13	8660 ± 0.5% (36-42 MHz) 8450 ± 0.5% (42-50 MHz)	R159	6-11009E73	10k	
93 23-8i 94 95 21-1: 96 8-11i 97 21-1: 200 23-8i	11015A07	01 + 80-20%	R26	6-84376L15	9090 ± 0.5% (42/30 MHz)	R160	6-11009E65	4.7k	
94 95 21-1: 96 8-111 97 21-1: 200 23-8-	84538G29	47 ± 20%, 10 V		6-84376L14	8660 ± 0.5% (36-42 MHz)	R161 162	6-11009E59	2 /k	
97 21-1	11015A07	01 + 80-20%		6-84376L13	8450 ± 0 5% (42-50 MHz)	R163	6-11009E33	220	
200 23-8	1017B01	001,50 V	R27	6 11009E37	330	R164, 165	6-11009E73	10k	
200 23-8- 202 21.83 203 tho: 213 21.43	11015A07	01 + 80-20%	R40	6-11009A73	10k	R166, 167 R168	6-11009E71	8 2k 56k	
202 210 210 210 210 210 210 210 210 210	84538G06	47 ± 20%, 20 V 05 + 80-20%; 25 V	H40 H40A	6-11009A89	47k 47k	R168 R169, 170	6-11009E91 6-11009E67	56k 5.6k	
	82372C04 11015A07	.01 + 80-20%	B41	6-11009E89 6-11009E73	10k	R171	6-11009E75	12k	
701 thru 703 21-1	11015A07	01 + 80-20%	R42 thru 51	6-11009A73	10k	B172	6-11009C72	9.18	
704 21-1	11015B01	100 pF	R52	6-11009A39	390	R173	6-11009E65	4.7k	
705 21-8	84493B02	22 pF + 5% 50 V	R53	6-11009E59	2 7k	R174	18-84143N06	variable, 50k	
711 21-83	83406D44	47 pF + 5°, 50 V	R54	6-11009E49	1k	R175, 176, 177	18-84143N01	variable, 10k	
714 21-1	11015A07	01 + 80 20% 01 + 80-20% (30-50 MHz)	R55 R56	6-11009E25 6-11009E82	100	R180 R208	6-11009A97 6-11009E81	100k 22k	
723 21-1 724 21-1 725 21-8 726 21-8			R57	6-11009E82	24k 22k	R209	6-11009E81	1 2k	
725 21-83	82204B64	75 pF + 5%: 50 V (30-50 MHz)	R58	6-11009A49	1k	R210	6-11009E89	47h	
726 21-82	82610C42	470 pF 75 pF ± 5%; 50 V (30-50 MHz) 62 pF ± 5%, 50 V (30-50 MHz) 47 pF ± 5%	R59	6-11009E65	4.7k	R211	6-11009A73	10k	
727 21-1	11014H41	47 pF ± 5%	R60 61	6-11009A67	5 6k	R212	6-11009A89	47k	
728, 730 21-1	11015A07	01 + 80-20%	R62	6-11009A43	560	R213	6-11009A65	4 7k	
729 21-17	11015B01 82355B62	100 pF 1 pF ± 0 25 pF, 50 V	R63 R64 65	6-11009E73 6-11009A73	10k	R214 R700	6-11009A73 6-11009A57	10k 2.2k	
731 21-82	11015A07	.01 + 80-20%	H64 65 R66	6-11009A73 6-11009A41	10k 470	R700	6-11009A57 6-11009A95	2 2 K 82 k	
732, 733 21-1 736 21-83	82204B29	43 pF ± 3% , 50 V (30-36 MHz)	R67 68	6-11009A41	150	R702	8-11009E75	12k	
21-83	83406D93	16 pF ± 5% 50 V (36-42 MHz)	R70 71	6-11009A51	1.2k	R703	6-11009A18	51	
	11015A07	01 + 80-20%	B71A	6-11009A18	51	F1704	6-11009A29	150	
			R72	6-11009A17	47	R710	6-11009A65	4 7k	
		diode: (see note)	R73 74	6-11009E87	39k	R711	6-11009A53	1.5k	
R1. 2 48-83		silcon	R75	6-11009E97	100k	8712 8713	6-11009A18 6-11009A29	51	
		silicon	R76 B77	6-11009E99	120k 43k	R713 R719	6-11009A29 6-11009E59	2 7k (30 50 MHz)	
		germanium silicon	B77 B78	6-11009E88 6-11009E64	43k 4.3k	R720	6-124A34	2 /k (30 50 MHz) 240	
		bot carrier	H78 H79	6-11009E64 6-11009E39	4 3x 390	R722	6-11009A49	1k	
38 48-83		silicon	RBD	6-11009E73	10k	B723	6-11009A57	2 2x	
4000			R81	6-11009E77	15k	R724 725	6-11009A49	1k	
		light emitting diode: (see note)	R82	6-11009A77	15k	R726	6-11009A61	3.3k	
51 48-88		red	R83.84	6-11009A67	5 6k	R727 R728	6-11009A39	390 3.3k	
52 48 88	88245C04	green	R85 R86	6-11009A57 6-11009A67	2 2k 5 6k	R728 R729	6-11009A61 6-11009A73	3.3k 10k	
	88245C04	connector, receptacle:	R87	6-11009A67 6-11009A89	5 5K 47k	R730	6-11009A73	510	
.2,3 9-849	88245C04 88245C06	female, single contact	R88	6-11009A67	5 6k	11130	J000A4E		á
	88245C04 88245C06	male Contact	R89	6-11009A89	47k				
28-82	88245C04 88245C06 4968D01	male, 8 contact	R90	6-11009A73	10k				

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R731	6-11009A77	15k
R732	6-11009A53	1.5k
R733 R734	6-11009E47 6-11009A09	820
H734	b-11009A09	ZZ
		thermistor
RT600	6-858402	1k @ 25°C
		Integrated circuit: (see note)
U1	51-84371K76	dual timer
U3 thru 8 U9	51-82884L38 51-84561L04	presettable - N counter
U10	51-84561L15	quad 2-input NAND gate dual "D" flip-flop
U11	51-83627M11	quad 2-input NAND gate
U12	51-82848M23	quad 2-input exclusive OR gate
U13	51-84561L15	dual "D" flip-flop
U14, 15	51-84561L10	decade counter
U16	51-84371K37	dual 4-line to 1-line multiplexer
U17	51-82609M79	quad 2 exclusive OR gate
U18	51-80291802	14.4 oscillator
U19, 20 U21	51-84561L85 51-83629M18	1 - 12 counter quad op amplifier
U22	51-83629M32	dual op amplifier
U23	51-82884L62	programmable timer
U601	51-84768F68	prescaler
U602	51-84768F63	programmable divider
U603	51-84768F59	sample and hold phase detector
U604	TRN5481A	ROM (Specify Customer Frequency)
U606	51-84371K74	quad comparator
U607	51-84371K94	quad 2-input OR gate
U609	51-83629M32	dual op amplifier
		referenced items
	3-134212 9-84924E02	SCREW, tapping: 4-40 x 5/16", 6 used
	9-84207801	IC SOCKET; 16 pin METERING TRAY; 7 pin
	26-84030N01	SHIELD, wall multiplier
	26-84031N01	SHIELD, wail binary modulator
	26-84032N01	SHIELD, component side loop filter
	26-84055N01	SHIELD, multi solder side multiplier
	26-84056N01	SHIELD, driver solder side divider
	26-84061N01	SHIELD, component side ret amplifier
	26-84062N01	SHIELD, component side ref loop
	26-84063N01 26-84072N01	SHIELD, component side binary modu
		SHIELD, component side phase detec
	26-84093N01	SHIELD, solder side ampl
	26-84093N01 26-84094N01	SHIELD, solder side ampl SHIELD, solder side loop filter
	26-84093N01 26-84094N01 26-84095N01	SHIELD, solder side ampl SHIELD, solder side loop filter SHIELD, solder side rf loop
	26-84093N01 26-84094N01 26-84095N01 26-84248B01	SHIELD, solder side ampl SHIELD, solder side loop filter SHIELD, solder side rf loop SHIELD, can
	26-84093N01 26-84094N01 26-84095N01 26-84248B01 42-84284801	SHIELD, solder side ampl SHIELD, solder side loop fifter SHIELD, solder side rf loop SHIELD, can RETAINER, 6 used
	26-84093N01 26-84094N01 26-84095N01 26-84248B01	SHIELD, solder side ampi SHIELD, solder side (oop filter SHIELD, solder side if loop SHIELD, can RETAINER, 6 used CLIP, coaxial; 3 used
n ote : For optimu	26-84093N01 26-84094N01 26-84095N01 26-84248B01 42-84284B01 29-80014A01 30-83794C01	SHIELD, solder side ampl SHIELD, solder side loop filter SHIELD, solder side or loop SHIELD, can RETAINER, 6 used CLIP, coaxial; 3 used CABLE, coaxial, WHT
re ordered by Mol	26-84093N01 26-84094N01 26-84095N01 26-84248B01 42-84284B01 29-80014A01 30-83794C01 m performance, d orola part number	SHELD, solder side ampl. SHELD, solder side hop litter SHELD, solder side riop from SHELD, solder side riop SHELD, can SHELD, can CLIP, coaxisi, 3 used CABLE, coaxisi, 3 used CABLE, coaxisi, 3 white codes, transisiors, and integrated circuits.
re ordered by Mol	26-84093N01 26-84094N01 26-84095N01 26-84248B01 42-84284B01 29-80014A01 30-83794C01 m performance, d orola part number	SHIELD, solder side ampl. SHIELD, solder side ideo pitter SHIELD, solder side ideo pitter SHIELD, solder side if loop SHIELD, solder side if loop SHIELD, solder side if loop CLIP, coaxial; Suped CLIP, coaxial; Suped CABLE, coaxial, WHT odes, transistors, and integrated circus s (Delete HSO)
FRN5960A Synthe FRN9035A Synthe REFERENCE	26-84093N01 26-84094N01 26-84298N01 26-84248B01 29-80014A01 30-83794C01 m performance, d orola part number	SHEED, solder side ampl. SHEED, solder side cop. Inter SHEED, solder side to cop. SHEED, can RETAINER, Gued CLIP, coaxiat, 3 used (CRE, coaxiat, 3 used) (Interior of the coaxiat, 3 used) (In
FRN5960A Synthe FRN9035A Synthe REFERENCE	26-84093N01 26-84095N01 26-84095N01 26-84248B01 42-84224B01 42-84224B01 42-84224B01 30-83794C01 m performance, d orola part number sizer Hardware K MOTOROLA PART NO.	SHELD, solder sloe ampl SHELD, solder sloe ophter SHELD, solder sloe SHELD, sold
FRN5960A Synthe FRN9035A Synthe REFERENCE	26-84093N01 26-84095N01 26-84095N01 26-84248B01 42-84248B01 42-8428B01 42-8428B01 42-8428B01 42-8428B01 42-8428B01 MOTOROLA PART NO. 3-134212 180759038	SHELD, sodier side ampt SHELD, sodier side top lifter SHELD, sodier side top lifter SHELD, sodier side of lifter SHELD, sodier side
FRN5960A Synthe FRN9035A Synthe REFERENCE	26-84093N01 26-84095N01 26-84095N01 26-84248B01 42-84224B01 42-84224B01 42-84224B01 59-80014A01 30-83794C01 m performance, d orola part number seizer Hardware K NOTOROLA PART NO. non- 3-134212 1-80759038	SHELD, sodier side ampl SHELD, sodier side ampl SHELD, sodier side son side side side side side side side side
FRN5960A Synthe FRN9035A Synthe REFERENCE	26-84093N01 26-84095N01 26-84095N01 26-84248B01 42-842248D1 42-842248D1 30-83794C01 mperformance, d orocla part number bestzer Hardware K MOTOROLA PART NO. 3-134212 18-0759038 15-83801N01	SHELD, sodier sloe ampl SHELD, sodier sloe ophter SHELD, sodier sloe ophter SHELD, sodier sloe ophter SHELD, sodier sloe ophter SHELD, sodier sloe
FRN5960A Synthe FRN9035A Synthe REFERENCE	26-84093N01 26-84093N01 26-84095N01 26-84248801 42-84224801 30-83794C01 mperformance, d orola part number bestzer Hardware K sizer Hardware K MOTOROLA PART NO. non- 3-134212 180799038 41-84811801 41-84811801 41-84811801	SHELD, sodier side ampl SHELD, sodier side top filter SHELD, sodier side top filter SHELD, sodier side of filter SHELD, sodier side
FRN5960A Synthe FRN9035A Synthe REFERENCE	26-84093N01 26-84095N01 26-84095N01 26-84248B01 42-842248D1 42-842248D1 30-83794C01 mperformance, d orola part number bestzer Hardware K MOTOROLA PART NO. 3-134212 18-0759038 15-83801N01 42-842248D1 2-8364	SHELD, sodier side amplifier SHELD, sodier side opporter SHELD, can am fridge SHELD, can am f
FRN5960A Synthe FRN9035A Synthe REFERENCE	26-84093N01 26-84095N01 26-84095N01 26-8429801 42-84224801 42-84224801 30-83794C01 mperformance, d orola part number sester Hardware K MOTOROLA PART NO. 31-34212 180799038 11-8-33501N01 41-84811801 26-364 21-32616	SHELD, sodier side ampt SHELD, sodier side copyliter SHELD, sodier side opyliter SHELD, sodier side opyliter SHELD, sodier side of the second copyliter SHELD, sodier side opportunities SHELD, sodier side opportuni
FRN5960A Synthe FRN9035A Synthe REFERENCE	26-84093N01 26-84093N01 26-84095N01 26-84248801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 43-9669	SHELD, sodier side ampl SHELD, sodier side ampl SHELD, sodier side solp filter SHELD, sodier side of fi
FRN5960A Synthe FRN9035A Synthe REFERENCE	26-84093N01 26-84095N01 26-84095N01 26-8429801 42-84224801 42-84224801 30-83794C01 mperformance, d orola part number sester Hardware K MOTOROLA PART NO. 31-34212 180799038 11-8-33501N01 41-84811801 26-364 21-32616	SHELD, sodier side amplifies SHELD, sodier side if loop SHELD, can SHELD, sodier side if loop SH
FRN5960A Synthe FRN9035A Synthe REFERENCE	26-84093N01 26-84093N01 26-84095N01 26-84248801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 42-84224801 43-9669	SHELD, solder side ampl SHELD, solder side top fifter SHELD, solder side top fifter SHELD, solder side of fifter SHELD, solder side
FRN5960A Synthe FRN9035A Synthe REFERENCE	26-84093N01 26-84093N01 26-84095N01 26-84095N01 26-84095N01 29-80014A01 30-83794C01 m performance, dorota part numbes foroia part numbes mortal part numbes part numbes part numbes part numbes part numbes non- 3-134212 180799028 15-83801N01 41-84811801 42-84284801 2-80958 3-134185	SHELD, sodier side amplifies SHELD, sodier side if loop SHELD, can SHELD, sodier side if loop SH
FRN5960A Synthe FRN9035A Synthe REFERENCE	28-4098N01 28-4098N01 28-8098N01 28-8098N01 28-8098N01 28-8098N01 28-80098N01	SHELD, solder side ampl SHELD, solder side op filter SHELD, solder side op filter SHELD, solder side op filter SHELD, solder side of floop SHE
FRN5960A Synthe FRN9035A Synthe REFERENCE	20-84098NO1 26-84098NO1 26-840	SHELD, solder side ampl SHELD, solder side op filter SHELD, solder side op filter SHELD, solder side op filter SHELD, solder side of floop SHE
FRN5960A Synthe FRN9035A Synthe REFERENCE	28-4098N01 28-4098N01 28-8098N01 28-8098N01 28-8098N01 28-8098N01 28-80098N01	SHELD, sodier side amplifies SHELD, sodier side if loop SHELD, can SHELD, sodier side if loop SH

7.83804N01 BRACKET, rack mounting, 2 used 14-84210A01 INSULATOR, transistor

CHASSIS, main

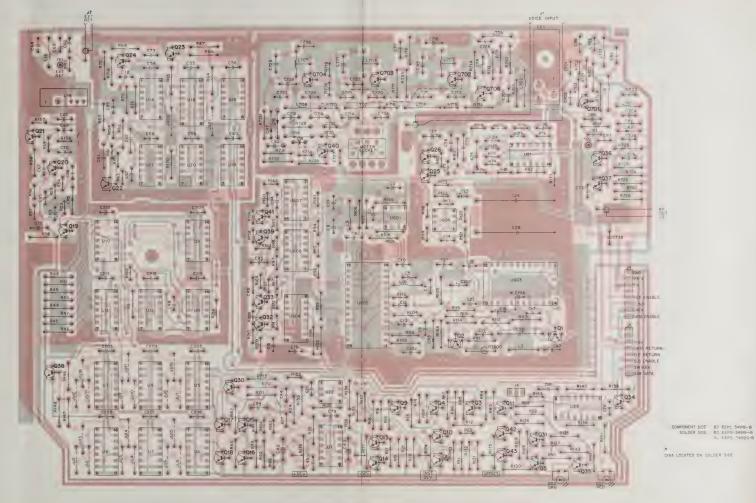
64-83061P01 ADAPTER, coax connector (TRN9035A only)

32 82796H01 GASKET, 41" used

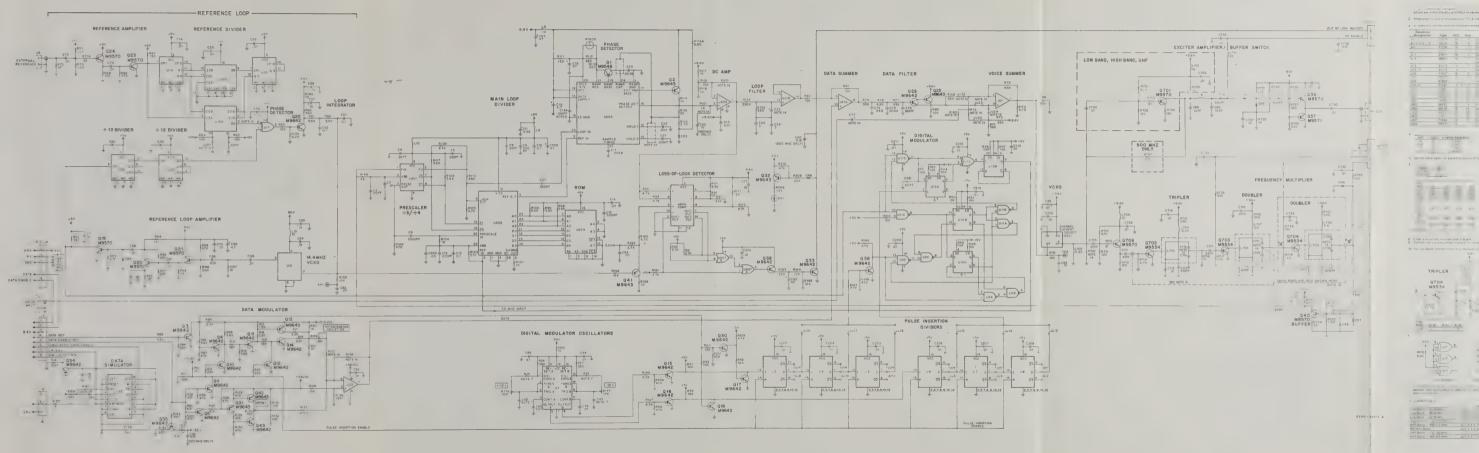
75-82200H01 PAD (TRN9035A only) note: Y1 not field servicable. Order entire kit if replacement is needed

36.82630H01 KNOB control 43 10846A09 STANDOFF 2 used

LOW, HIGH AND UHF BANDS SYNTHESIZER BOARD



SHOWN FROM COMPONENT SIDE



TRIPLER

Q704 M9534

May 30:36 36:44 44:50

100 (ge + 60)
100 (de to 100)

Paging Synthesizer Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34989-B

9/15/83 - V&G

900 MHZ SYNTHESIZER BOARD



SHOWN FROM COMPONENT SIDE



TLN2559B PURC[™] SIMULCAST CONTROL MODULE

1. GENERAL DESCRIPTION

- 1.1 The TLN2559B Simulcast Control Module (SCM) is a plug-in unit for the remote control chassis of a *PURC* paging station. The SCM consists of two circuit boards, TRN5379B Control Board and TRN5603B Logic Board, fixed together to form the module. The SCM replaces the function tone decoder in the *PURC* station, providing the keying function to the paging transmitter in response to input signals Push-To-Talk (PTT) Control or Line PTT. Key-up output signals are provided on the Channel Element Ground, PL Enable, F1 Ground, and F2 Ground lines.
- 1.2 The TRN5379B Control Board has the interface circuitry required to connect the microcomputer on the TRN5603B Logic Board to the base station and an on-board power supply to run the logic board.
- 1.3 The TRN5603B Logic Board contains the MC6803 microcomputer, program ROM, code selector switches, and the support devices for the microcomputer.

2. OPERATION

2.1 The basic function of the SCM is to decode function tone (FT) inputs and key or disable the transmitter in response to correct codes. The key-up request lines on the SCM have different levels of priority. PTT Control is an immediate-response input with lower priority than Line PTT. Line PTT initiates the microcomputer examination of the FT input line. The FT input goes through waveshaping circuitry and is then applied to the microcomputer. The microcomputer compares the FT input sequence to the code set in the selector switches to determine if the transmitter should be keyed up or not. The group and function tone selection is done according to Table 1 and Table 2.

Table 1. Group Selection

G0	G1	
ON	ON	
OFF	OFF	
ON	OFF	
OFF	ON	
	ON OFF ON	ON ON OFF OFF ON OFF

Note: Station cannot be disabled when Group 0 is selected.

- 2.2 The SCM provides the Delayed Keyed A + signal to the *PURC* station in response to a Keyed A + input signal. The Delayed Keyed A + stays active for about 300 milliseconds after the Keyed A + signal drops out. This delay allows the station to have an active A + signal during temporary losses of Keyed A + that can occur during mode changeover sequencing. Delayed Keyed A + also keeps the SCM active during these short periods.
- 2.3 A Line PTT input signal causes the SCM to generate DC Line Disable and FT Window Control signals. DC Line Disable causes the Guard Tone Module to hold Line PTT active. If the function tone sequence stops before the SCM detects KT1, the FT Window Control times out and DC Line Disable also becomes inactive about 60 milliseconds after tone input stops. If the microcomputer detects too many function tones, the DC Line Disable is dropped. In either case the latest tones are wiped from memory and the SCM returns to input line scanning. In normal operation the FT Window Control closes and DC Line Disable drops after the SCM detects KT1.

Table 2. Function Tone Selection

Tone Switch	Tone Frequency (Hz)
T10	750
Т9	950
T8	1050
T7	1150
T6	1250
T5	1350
T4	1450
T3	1550
T2	1650
· T1	1750

KT1, end-of-sequence indicator tone, is 1950 Hz. KT1A, Group I-to-Group II mark, is 850 Hz. KT1B, Group II-to-Group III mark, is 2350 Hz.

parts list

TLD9332A Synthesizer Board; 132-150 MHz TLD9333A Synthesizer Board, 150-174 MHz TLE5491A Synthesizer Board, 406-420 MHz

TLF6582A Synthi	esizer Board, 928-9	60 MHz PL-8091-A			
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	REFERENCE	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed: uF ± 10%; 100 V:	C724	21-11015809	470 pF
C2	21 11014H32	unless otherwise stated 20 pF ± 5%, 50 V	C725	21-83406D93	16 pF ± 5%, 50 V (150-174 MHz, 450 512 MHz, 928-960 MHz)
C2 C3	21-11015A07	.01 + 80-20%; 100 V		or 21-83408D81	20 pF; ± 5%: NPO, (132-150 MHz,
C4	21-11014H32	20 pF ± 5%; 50 V			406-420 MHz)
C5 C6	21 11015B05 21 82187B44	220 pF 1000 pF	C726	21 83406D90	11 pF ± 5% 50 V (150-174 MHz, 450-512 MHz, 928-960 MHz)
C8	21 11014H32	20 pF ± 5%: 50 V		or 21-83406D57	13 pF ± 5%: NPO, (132-150 MHz,
C9	21 11015B05	220 pF			406-420 MHz)
C10 C11	8-1101'B17 23 11013F10	0 1 50 V 0 56 35 V	C727 C728, 730	21-11014H41 21 11015A07	47 pF ± 5% 01 + 80-20*
C12	21 11015805	220 pF	C728, 730	21 11015B01	100 pF
C13 C14	8-11017B17	0 1.50 V	C731	21 82355B62	1 pF ± 0 25 pF, 50 V
C14 C15	21 11015A07 21 11015B05	01 +80·20° » 220 pF ± 5° »	C732 733 C734 735	21-11015A07 21 11015A07	01 + 80·20° a 01 + 80·20° a
C16	21 11015A07	01 + 80·20° c	C737, 738	21 11015A07	01 + 80 20%
C17	8-11017B07	0068; 50 V	C740	23-84538G06	47 ± 20%; 20 V
C18 C19	23-11013D55 23-84538G06	4.7 ± 20%; 20 V 47 ± 20% 20 V			diode: (see note)
C19A	21-11015B01	100 pF	CR1, 2	48-83510F03	silcon
C20	8-80027808	.0039 ± 5%	CR3	48-83329G02	silicon
C21 C22	8-11017B06 8-11017B01	.0047; 50 V .001; 50 V	CR4 CR5	48-82178A01 48-83654H01	germanium silicon
C23	23-84538G14	1: 35 V	CR6, 7	48-84616A04	hot carrier
	or 23-84762H14	0.47 (928-960 MHz)	CR8	48-83654H01	sliicon
C24 C26	8-80026B04 21-11015A07	5; 50 V .01 + 80-20%			
C26	21-11015A07 21-11015B01	.01 + 80-20% 100 pF	DS1	48-88245C04	light emitting diode: (see note) red
C28	8-80026804	5; 50 V	DS2	48-88245C06	green
C30	23-84538G05	10.0 (928-960 MHz)			
C40 C42, 43	21-11015A07 21-82537B49	.01 (928-960 MHz) 3900 pF ± 1% (150-174 MHz, 450-512 MHz,	J1, 2, 3	9-84968D01	connector, receptacle: female; single contact
044,40	2102301540	928-960 MHz)	J4, 5	28-82622L07	male; 8 contact
	or 21-82537B45	5000 pF; ± 5%; (132-150 MHz, 406-420 MHz)	J6	28-82622L01	male; 3 contact
C44, 45 C48	21-11015A07 21-11014H44	.01 + 80-20% 62 pF ± 5%			coll, rf:
C54 thru 56	21-11015A07	.01 +80-20%	L3	24-82723H07	choke: 10 uH
C57	23-84538G04	15	L8	24-82723H07	choke; 10 uH
C58, 59, 60 C61, 62	21-11015A07 21-82372C09	.01 + 80-20% 0.1 + 80-20%; 25 V	L9, 10 L13	24-83961B01 24-82723H07	3 turns choke; 10 uH
C63	23-84538G04	0.1 + 80-20%; 25 V 15	L701	24-82723H07	choke; 10 uH (not used for 928-960 MHz)
C64 thru 68	6-11015A07	.01 + 80-20%	L702	24-80900A61	choke: 0.62 uH
C69	23-11013D55	4.7 ± 20%; 20 V	£703 £704	24-84972A15 24-83857G08	tunable; 4-1/2 turns (RED) tunable; 3-1/2 turns (VIO)
C70 thru 73	21-11015A07 8-83813H23	.01 + 80-20% .088 ± 5%; 50 V	L704 L705	24-83857G08 24-83857G08	variable: 3-1/2 turns (VIO)
C74 C75	8-83813H37	0068 + 5%	L706	24 82549D09	variable; 3-1/2 turns (VIO) choke, 15 uH
C76	21-84426848	665 pF + 5% 500 V	L707, 708	24-82835G08	choke, 2 6 uH
C77	23-84538G29 or 23-84538G03	47 ± 20% 10 V .10 (928-960 MHz)	L709 L710	24-82723H07 24-82723H03	choke, 10 uH choke; 23 uH
C78, 79	21-11015A07	.01 + 80-20%	Erio	E-F-0E/1E0/100	01101101, 20 011
C80	21-11014H41	47 pF ± 5%			transistor: (see note)
C81 C82 83	8-82905G03 21-11015A07	047 ± 5% 50 V 01 + 80 20° s	Q1 Q2	48-869548 48-869643	PNP: type M9548 PNP: type M9643
C84	23-84538G29	47 = 20° o 10 V	Q3, 4, 5	48-869642	NPN type M9642
C85, 86	21-84494829	10 pF ±5%, 500 V	Q9, 10, 11, 12	48-869642	NPN, type M9642
C87, 88 C89	23-84538G29 21-11015A07	47 ± 20%; 10 V .01 + 80-20%	Q13 Q14 thru 18	48-869643 48-869642	PNP; type M9643 NPN; type M9642
C91	21-11015A07	.01 + 80-20%	Q19, 20, 21	48-869570	NPN; type M9570
C93 .	23-84538G29	47 ± 20%; 10 V	Q22	48-869642	NPN; type M9642
C94, 95	21-11015A07	.01 + 80-20%	Q23, 24 Q25	48-869570 48-869643	NPN; type M9570 PNP; type M9643
C96 C97	8-11017B01 21-11015A07	.001; 50 V .01 + 80-20%	Q25 Q26	48-869642	NPN; type M9642
C98	21-11015A07	0.001 (928-960 MHz)	Q30	48-869642	NPN; type M9642
C200	23-84538G06	47 ± 20%, 20 V	Q31, 32 Q33, 34, 35	48-869643 48-869642	PNP; type M9643 NPN; type M9642
C202 C203 thru 213	21-82372C04 21-11015A07	.05 + 80-20%; 25 V 01 + 80-20%	Q36	48-869570	NPN; type M9570
C701 thru 703	21 11015A07	01 + 80-20% (see note)	Q37	48-869571	PNP, type M9571
C704 C705	21-11015B01 21.84493B02	100 22 pF - 5% 50 V	Q38, 39 Q40	48-869642 48-869570	NPN, type M9642 NPN, type M9570
C711	21-83406D44	47 pF ±5%;50 V	Q41, 42	48-869643	PNP, type M9643
C712	21-11015A07	.01 + 80-20%	Q43	48-869642	NPN; type M9642
C713	21-11015809	470 pF	Q701 Q702, 703	48-869570 48869534	NPN; type M9570 (not used for 928-980 MF NPN; type M9534
C714 C715	21-11015A07 21-82610C09	.01 + 80-20% 120 pF (150-174 MHz, 450-512 MHz,	Q702, 703 Q704	48-869534	NPN; type M9534
0715	21-02010000	928-960 MHz)	Q706	48-869570	NPN; type M9570
	or 21-82610C70	150 pF, ± 5%: NPO, (132-150 MHz,			resistor, fixed: ±5%; 1/4 W;
C716	21-82610C42	406-420 MHz) 62 pF ± 5%; 50 V (150-174 MHz,			unless otherwise stated
C/10	21-02010042	450-512 MHz, 928-960 MHz)	R9	8-11009A25	100
	or 21-82610C44	100 pF; ± 5%: N220, (132-150 MHz,	R10	6-11009A49	1k
0717	21-84493802	406-420 MHz) 22 ± 5%; 50 V	R11 R12	6-11009A97 6-11009A81	100k 22k
C717 C718, 719	21-84493B02 21-11014H41	22 ± 5%; 50 V 47 pF ± 5%	R12 R13, 14	6-11009A67	5.6k
G720	21-83596E13	.001; 500 V	R15	6-11009A55	1.8k
C721	21-82610C44	100 nF + 5%: 50 V (150-174 MHz.	R16 R17	6-11009A61 6-11009A57	3.3k 2.2k
	or 21-82610C09	450-512 MHz, 928-980 MHz) 120 pF; ± 5%: N220, (132-150 MHz,	R17 R18	6-11009A57 6-11009A87	2.2k 39k
		406-420 MHz)	R19	6-11009A57	2.2k
C722	21-82610C03	47 pF ± 5%; 200 V (150-174 MHz,	R20, 21	6-11009A49 6-11009A73	1k 10k
	or 21-82810C30	450-512 MHz, 928-960 MHz) 68 pF, ± 5%. N330, (132-150 MHz,	R22	0-11UU9A73	101
		406-420 MHz)			
C723	21-11014H25	10 pF ± 0.5 pF			

DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
oF .	R23	6-11009E81	22k
± 5%, 50 V (150-174 MHz,	R24 R25 26	6-11009A37	330
12 MHz, 928-960 MHz)	H25, 26	6-84376L15	9090 ± 0.5% (150-174 MHz, 450-512 MHz, 928-960 MHz)
F; ± 5%; NPO, (132-150 MHz, (20 MHz)		or 8-84376L09	7.68k, ± 0.5%, (132-150 MHz, 406-420 MHz)
120 MTIZ) 2 + 6% 50 MH50 174 MH3	R27	6-11009E37	330
± 5% 50 V (150-174 MHz, 512 MHz, 928-960 MHz)	R39	6-11009A73	10k
± 5%: NPO, (132-150 MHz,	B40	6-11009A89	47k
(20 MHz)	R40A	6-11009E89	47k
+ 5%	R41	6-11009E73	10k
80-20*。 oF	R42 Ihru 51	6-11009A73	10k
F	R52	6-11009A39	390
± 0 25 pF, 50 V 80-20° o	R53	6-11009E59	2.7k
80-20° a	R54	6-11009E49	1k ,
80-20**	R55 R56	6-11009E25	100
- 80-20% 20%; 20 V	R57	6-11009E82	24k 22k
20%; 20 V	R58	6-11009E81 6-11009A49	22K 1k
e: (see note)	R59	6-11009E65	4.7k
e. (586 Hota)	R60, 61	6-11009A67	5.6k
on	R62	6-11009A43	580
nanium	R63	6-11009E73	10k
on .	R64, 65	6-11009A73	10k
arrier	R66	6-11009A41	470
Dn .	R67, 68	6-11009A29	150
	R70, 71	6-11009A51	1.2k
emitting diode: (see note)	R71A	6-11009A18	51
	R72	6-11009A17	47
n	R73, 74	6-11009E87	39k
	R75	6-11009E97	100k (132-174 MHz, 406-512 MHz)
nector, receptacle:	0.76	or 6-11009E92	62k (928-960 MHz)
ale; single contact e; 8 contact	R76 R77	6-11009E99 6-11009E88	120k 43k
; 8 contact	R78	6-11009E64	4.3k
3 contact	R79	6-11009E39	390
els.	R80	6-11009E73	10k
rf: :e: 10 uH	R81	6-11009E77	15k
ie; 10 uH	R82	6-11009A77	15k
ns	R83, 84	6-11009A67	5.8k
te; 10 uH	R85	6-11009A57	2.2k
te; 10 uH (not used for 928-960 MHz)	R86	8-11009A67	5.6k
te; 0.62 uH	R87	6-11009A89	47k
ble; 4-1/2 turns (RED)	R88	6-11009A67	5.6k
ble; 3-1/2 turns (VIO)	R89	6-11009A89	47k
ible; 3-1/2 turns (VIO)	R90 *	6-11009A73	10k
re, 15 uH	R91, 92	or 6-11009E73 6-11009E59	10k, (928-960 MHz) 2 7k
e, 2 6 uH	R93, 94	6-11009E65	4 7k
e, 10 uH e; 23 uH	R95	6-11009E57	2.2k
18, 23 011	R96	6-11009E75	12k
sistor: (see note)	R97	6-11009E66	5.1k
type M9548	R98, 99, 100	6-11009A67	5 6k
type M9548 type M9643	R101	6-11009A49	1k
type M9642	R103	6-11009A35	270
, type M9642	R104	6-11009A49	1k
type M9643	R105	6-11009A65	4.7k
type M9642	R106	6-11009A41	470
type M9570	R107, 108	6-11009A67	5.6k
type M9642	R109 R110	6-11009A65 6-11009E45	4.7k 680
type M9570	R110 R111	6-11009E45 6-11009A29	150
type M9643	H111 R112	6-11009A29	390
; type M9642	R113	6-11009A39	220
; type M9642 ; type M9643	R114	8-11009A01	10
; type M9643 ; type M9642	R115	6-11009A56	2k
type NONE	R116	6-11009A59	27k
type M9570 type M9571	R116A	6-11009A67	5 6k
tyon M9642	R117, 118	6-11009E49	1k
type M9570	R119	6-11009E73	10k
type M9570 type M9643	R120	6-11009B23	82
type M9642	R121	6-11009E49	1k
; type M9642 ; type M9570 (not used for 928-960 MHz)		or 6-11009E49	680; (829-960 MHz)
: type M9534	R122	6-11009F10	330k
; type M9534	R123	6-11009E87	39k
type M9570	R125, 126	6-11009A89	47k
	R127	6-11009A73	10k
tor, fixed: ±5%; 1/4 W;	R128	6-11009A89	47k 10k
ss otherwise stated	R129	6-11009A73	
	R130	6-11009A89 or 6-11009E89	47k 47k (928-960 MHz)
	R131, 132	6-11009E89	47K (928-960 MHZ) 10k
	H131, 132 H133	6-11009A73	470k
	H133 R134	6-11009B14 6-11009A77	15k (132-174 MHz, 406-512 MHz)
	A 100	or 6-11009A70	7.5k, (928-960 MHz)
	R135, 138	6-11009A77	15k, (820-800 WI12)
	R137	6-11009A84	30k (150-174 MHz)
	.1107	or 6-11009A90	51k (132-150 MHz)
		or 6-11009A93	68k (406-512 MHz, 928-960 MHz)
	R138 R139		68k (406-512 MHz, 928-960 MHz) 15k 56k

REFERENCE	MOTOROLA PART NO.	DESCRIPTION
SYMBOL 141		5,8k
142	6-11009A44	620
143	6-11009A87	39k
146 147	6-11009A65 6-11009A59	4,7k 2.7k
148	6-11009A39 6-11009A89	2.7K 47k
149	6-11009A19	56
150	6-11009E73	10k
151 152	6-11009A73 6-11009E01	10k 10
153	6-11009E49	1k
154	6-11009E23	82
155 156	6-11009E71 6-11009E67	8 2k 5 6k
157	6-11009C18	51
158	6-11009E73	10k
159 180	6-11009E01 6-11009E65	10
160 161 162	6-11009E85 6-11009E59	4.7k 2.7k
161, 162 163	6-11009E33	220
164, 165	6-11009E73	10k
166, 167 168	6-11009E71 6-11009E91	8.2k 56k
169, 170	B-11009E67	5.6k
169, 170 171	6-11009E75	12k
172	6-11009C72	9.1k
173 174	6-11009E65 18-84143N06	4.7k variable; 50k
174 175, 176, 177 180	18-84143N01	variable; 10k
180	6-11009A97	100k
208	or 6-11009B06 6-11009E81	220k (928-960 MHz) 22k
209	6-11009E51	1.2k
210	6-11009E89 6-11009A73	47k
211 212	6-11009A73	10k 47k
213	6-11009A89 6-11009A65	47k
214	6-11009A73	10k
700	6-11009A57	2.2k
701	6-11009A57 or 6-11009A45 6-11009A95	680, (926-960 MHz) 82k (not used for 928-960 MHz)
702	6-11009E75	12k (not used for 928-960 MHz)
702 703	6-11009A18	51 (not used for 928-960 MHz)
704 710	6-11009A29 6-11009A65	150 (not used for 928-960 MHz) 4.7k
711	6-11009A53	1.5k
712		51
713	6-11009A18 6-11009A29 6-11009A59	150 2.7k
714 715	6-124A34	2.7k 240
716	6-11009A49	1k
717 718	6-11009A59 6-124A34	2.7k 240
719	6-11009E49	1k
720	6-124A34	1k 240
722 .	6-11009A49 6-11009A57	1k (not used for 928-960 MHz)
723 724, 725	6-11009A37	2.2k 1k
	6-11009A61	3.3k
727	6-11009A39	390
728 729	6-11009A61 6-11009A73	3.3k 10k
729 730	6-11009A42	510
731	6-11009A77	15k
732	6-11009A53	1.5k
733 734	6-11009E47 6-11009A09	820 22
735	6-11009A85	33k
736	6-11009E77	15k
737	6-11009E35	270 (928-960 MHz only)
T600	6-858402	thermistor: 1k @ 25°C
		Integrated circuit: (see note)
1	51-84371K76	dual timer
3 thru 8	51-82884L38	presettable - N counter
9 10	51-84561L04	quad 2-input NAND gate dual "D" flip-flop
11	51-84561L15 51-83627M11	guad 2-input NAND gate
11	51-82848M23	quad 2-input exclusive OR gate dual "D" flip-flop
13	51-84561L15	dual "D" flip-flop
14, 15	51-84561L10 51-84371K37	decade counter dual 4-line to 1-line multiplexer
16 17	51-84371K37 51-82609M79	quad 2 exclusive OR gate
18	51-80291802	14.4 oscillator

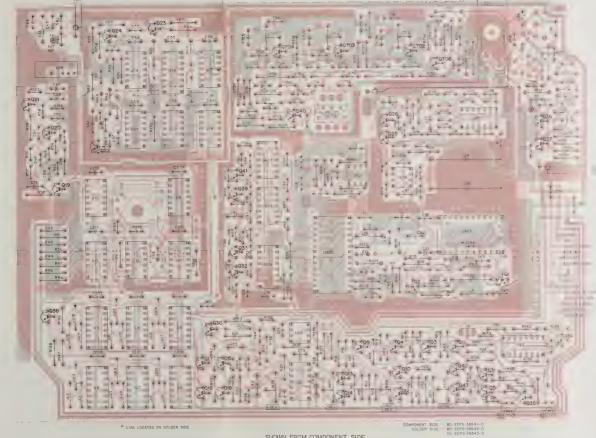
900 MHZ SYNTHESIZER BOARD

VOICE INPUT

REFEREN SYMBO		DESCRIPTION
U19, 20 U21 U22 U23 U601 U602 U603 U604 U606 U607 U609	51:84561L85 51:83629M18 51:83629M32 51:82884L62 51:84768F68 51:84768F59 TRN5481A 51:84371K74 51:83629M32	1 – 12 counter dual op amplitier dual op amplitier programmable timer prescaler programmable divider sample and nod phase delector ROM (Speet) Counterer Frequency) nuad communication and RO alle such conditions and counterer frequency) nuad counterer frequency) nuad counterer frequency)
	non	referenced items
	3-134212 9-84924E02 9-84924E02 9-84927B01 26-84033N01 26-84033N01 26-84055N01 26-84055N01 26-84055N01 26-84053N01 26-84053N01 26-84053N01 26-84055N01 26-84055N01 26-8428B01 48-	SCREW tapping 4.0 - 516, 6 used CSOCKET 186, 6

note: For optimum performance, diodes, translators, and integrated circuits must be ordered by Motorola part numbers

C702, C703 not used for 928-960 MHz



SHOWN FROM COMPONENT SIDE

Paging Synthesizer Schematic Diagram, Circuit Board Detail, and Parts List

Motorola No. PEPS-34989-B



TLN2559B PURC[™] SIMULCAST CONTROL MODULE

1. GENERAL DESCRIPTION

- 1.1 The TLN2559B Simulcast Control Module (SCM) is a plug-in unit for the remote control chassis of a *PURC* paging station. The SCM consists of two circuit boards, TRN5379B Control Board and TRN5603B Logic Board, fixed together to form the module. The SCM replaces the function tone decoder in the *PURC* station, providing the keying function to the paging transmitter in response to input signals Push-To-Talk (PTT) Control or Line PTT. Key-up output signals are provided on the Channel Element Ground, PL Enable, F1 Ground, and F2 Ground lines.
- 1.2 The TRN5379B Control Board has the interface circuitry required to connect the microcomputer on the TRN5603B Logic Board to the base station and an on-board power supply to run the logic board.
- 1.3 The TRN5603B Logic Board contains the MC6803 microcomputer, program ROM, code selector switches, and the support devices for the microcomputer.

2. OPERATION

2.1 The basic function of the SCM is to decode function tone (FT) inputs and key or disable the transmitter in response to correct codes. The key-up request lines on the SCM have different levels of priority. PTT Control is an immediate-response input with lower priority than Line PTT. Line PTT initiates the microcomputer examination of the FT input line. The FT input goes through waveshaping circuitry and is then applied to the microcomputer. The microcomputer compares the FT input sequence to the code set in the selector switches to determine if the transmitter should be keyed up or not. The group and function tone selection is done according to Table 1 and Table 2.

Table 1. Group Selection

	A		
Group	G0	G1	
0	ON	ON	
I	OFF	OFF	
II	ON	OFF	
III	OFF	ON	

Note: Station cannot be disabled when Group 0 is selected.

- 2.2 The SCM provides the Delayed Keyed A + signal to the *PURC* station in response to a Keyed A + input signal. The Delayed Keyed A + stays active for about 300 milliseconds after the Keyed A + signal drops out. This delay allows the station to have an active A + signal during temporary losses of Keyed A + that can occur during mode changeover sequencing. Delayed Keyed A + also keeps the SCM active during these short periods.
- 2.3 A Line PTT input signal causes the SCM to generate DC Line Disable and FT Window Control signals. DC Line Disable causes the Guard Tone Module to hold Line PTT active. If the function tone sequence stops before the SCM detects KT1, the FT Window Control times out and DC Line Disable also becomes inactive about 60 milliseconds after tone input stops. If the microcomputer detects too many function tones, the DC Line Disable is dropped. In either case the latest tones are wiped from memory and the SCM returns to input line scanning. In normal operation the FT Window Control closes and DC Line Disable drops after the SCM detects KT1.

Table 2. Function Tone Selection

Tone Switch	Tone Frequency (Hz)
T10	750
Т9	950
T8	1050
T7	1150
Т6	1250
T5	1350
T4	1450
T3	1550
T2	1650
T1	1750

KT1, end-of-sequence indicator tone, is 1950 Hz. KT1A, Group I-to-Group II mark, is 850 Hz. KT1B, Group II-to-Group III mark, is 2350 Hz. 2.4 The Channel Element Grounds and PL Enable outputs become active after all conditions have been met. Since the Channel Element Grounds are the final transmitter key-up control, any condition that inhibits the transmitter causes these signals to become inactive.

3. CIRCUIT DESCRIPTION

3.1 INPUT CIRCUITS

3.1.1 PTT Key-Up Lines

The PTT inputs are normally high and go low when active. The 12 volt input is converted to a logic-compatible 5 volts by input buffer U14. The buffer outputs then go directly to the input port of microcomputer U1.

3.1.2 Keyed A+

The Keyed A+ signal is applied to transistor Q8. Q8 charges C13 and causes Q9 to saturate. Q10 is normally on at this time, but has no effect. When the Keyed A+ signal goes low, Q8 shuts off and C13 begins to discharge through the network of R19-R20-R21-R22-R25, keeping Q10 shut off. After the discharge time period set by C13 and the resistor network, Q10 conducts, shutting off Q9. Delayed Keyed A+ then goes low.

3.1.3 Function Tone Input

Sine wave tones from the audio line are applied to lower and upper peak detectors U10A and U10B, respectively. The peak levels are applied to opposite ends of divider network R26-R27-R28. Transmission gate U11 shifts the reference of comparator U10D to either the high-level or low-level reference point of the divider string. Since the circuit is wired in a hysteresis configuration, U11 selects the high-level reference if the input signal is below the reference point, and vice-versa. The output of U10D is a clean square wave signal which is passed through Q11, and then to the microcomputer.

3.2 OUTPUT CIRCUITS

DC Line Disable, FT Window Control, and the Channel Element Grounds are all transistor outputs driven directly from U1. PL Enable is driven by F1 Oscillator Ground through CR4, which allows PL Enable to be pulled low by another signal in the station without affecting F1 Oscillator Ground.

3.3 MICROCOMPUTER LOGIC

The central logic unit of the SCM is composed of microcomputer U1, octal latch U2, hex buffers U4 and U5 (with associated switch set S1), and address decoders

U6 and U7. Timers U8 and U9 perform a watchdog function, keeping track of the microcomputer "tickle pulses".

3.3.1 Microprocessor

U1 contains the master clock and timing generator, microprocessor, and 128 8-bit bytes of RAM. The processor communicates with the other circuitry of the SCM via four ports. Port 1 (pins 6-10) accepts the conditioned signals from the FT line and services the watchdog circuitry. Diodes CR9 and CR10 set the processor mode as "Extended Multiplexed." Port 2 (pins 13-19) handles all the input/output control signals. Port 3 (pins 22-29) provides the upper eight bits of the address bus. Port 4 (pins 30-37) provides the lower eight bits of address (through octal latch U2) and carries data from the data bus.

3.3.2 ROM

U3 contains the program information the processor needs to detect and process function tones. Address selection is done on pins 1-8, 19, 22, and 23. Data is brought out on pins 9-11 and 13-17.

3.3.3 FT Code Programming Circuit

FT codes are determined in switch set S1. The processor requests code information on address lines A14 and A15. The address decoder composed of U6 and U7 then allows the appropriate buffer to output switch code information to the data bus. The device to output data to the data bus is selected according to Table 3.

Table 3. Device Selection Address

Device		A14	A15	
ROM	4	1	1	
U4		1	. 0	
U5		0	1	
Not Used		0	0	

3.3.4 Watchdog Circuit

In normal operation, U1 generates a "tickle pulse" on the P22 line (pin 10) every 66 milliseconds. A time window is established by monostables U8A and U9 during which the "tickle pulse" must occur. The incoming "tickle pulse" triggers both monostables. U9 times out before the next "tickle pulse" while U8A is continuously triggered. If the "tickle pulses" are too far apart, U8A times out. The Q output of U8A then triggers U8B, the reset pulse generator. If the "tickle pulses" occur too close together, U9 is still active when the next "tickle pulse" occurs and gate U6B clears U8A, again triggering the reset pulse generator. When U8B is triggered, the reset signal passes through Q13 and is sent to the reset pin of U1. The Q12-R44-C27 network allows the processor to generate a "tickle pulse" within about 6 milliseconds after the falling edge of the reset pulse. If

U1 does not generate a "tickle pulse" in this period, U8B sends another reset pulse. If the "tickle pulse" occurs normally, U8A is triggered and U8B is shut off.

4. TROUBLESHOOTING

4.1 EQUIPMENT REQUIRED

- DC, 15 MHz Dual-Trace Oscilloscope
- Audio Oscillator
- 15 MHz Frequency Counter
- Voltmeter
- TLN8799A Servicing Board Kit

4.2 FUNCTIONAL TESTS

To service the SCM it is necessary to first unplug the module, plug in the TLN8799A extension, and then plug the SCM into the extender board. The steel cover can be removed from the TRN5603B Logic Board to gain access to the microcomputer logic assembly.

4.2.1 Power Supply

Measure the voltage on control board pin 12 (A+), pin 10 (9.6 V), and U13 pin 3 (5 V). Correct any problems.

4.2.2 Delayed Keyed A +

Connect one oscilloscope channel to the Keyed A+ line at pin 24 of the control board. Connect the other channel to the Delayed Keyed A+ line at pin 8. Set the oscilloscope to trigger on a low-going transition occurring on Keyed A+. Apply 12 V to Keyed A+ by using the local PTT switch or a test switch. Release the PTT switch and observe the oscilloscope second channel trace. The trace should show a high-level signal which drops to ground after about 300 milliseconds. If the

trace drops immediately, check the timing network for Q10 to determine if there is a component failure. If the trace stays high, check Q9 and Q10.

4.2.3 Input Buffer

The input buffer is a non-inverting level shifter. 12 V input signals should result in 5 V level output signals. Check all inputs and their corresponding outputs for correct levels. Replace U14 to correct any problems.

4.2.4 Function Tone Conditioning Circuit

Connect the audio oscillator to pin 11 (FT HI) of the control board through a .01 uF capacitor. Set the frequency to 1 kHz and the amplitude to 6 V p-p. Probe the collector of Q11 (line P20) with the oscilloscope to see a 0-5 V 1 kHz square wave signal. Reduce the generator output to 0.6 V p-p. The P20 signal remains the same. Measure the dc level of FT HI with no audio signal applied. Apply signal and observe U11 pin 14 (the comparator reference point) with the oscilloscope. The dc level at this point is the same as that of FT HI, but with a square wave of about 10% of the audio signal level applied to FT HI. Vary the audio signal amplitude and observe the square wave signal amplitude change. If the comparator reference does not show this hysteresis effect, check peak detectors U10A and U10B and their associated components, and transmission gate U11.

4.2.5 Control Outputs

The SCM output circuits are simple transistor drivers. Note that PL Enable and F1 Oscillator Ground are returned to a connection in the paging station, not to the SCM ground return. Make all measurements of these leads referenced to the TX Ground, pin 11.

Table 4. SCM/Station Jumper Selection (Refer to Station Module Jumper Charts)

120	ejer to Station Module Jumper	Charist
Affected Board	Conditions	Action
Non-unified Main Board TRN5349A (Low Band and VHF) 330 Watt Stations)	w/board part no. 84-84212N01	— remove JU15
550 Watt Stations)	w/board part no. 84-83601N01	remove JU15 connect option slot pin 10 to SCM pin 10 connect guard tone decoder pin 13 to SCM pin 19
Unified Main Board TRN4860A (Low Band through 960 MHz Low Power and UHF High Power)	A Color of the Col	connect option slot pin 10 to SCM pin 10 connect guard tone decoder pin 13 to SCM pin 19
TSI Module TRN4853A		- remove CR13 - remove R24 - add 47k resistor across C11
Station Control Module TRN4854A	Unified Chassis Stations	— remove Q12
Station Control Module TRN4854B		— remove JU8
Digital Modulator Module TRN4856A		— remove module
F1 Module TLN5293A w/ Optional Link Receiver		— remove C23 and C32
Guard Tone Decoder Module TLN2376A	systems with more than one rf link (more than 120 ms of HLGT)	— change C15 to 47 uF; 20%, 25 V tantalum (Motorola Part No. 23-82783B37) in the link transmitters and the paging station)

SIMULCAST CONTROL MODULE

MULCAST CONTROL MODULE

CIRCUIT BOARD DETAIL TRN5379B CONTROL BOARD

parts list

RN5379B Contro		PL-83
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	04 44045540	capacitor, fixed:
C1, 3	21-11015B13	.001 uF ± 10%; 100 V
C6	23-84538G06	47 uF ± 20%; 20 V
C7, 8, 9	21-11015A05	.0047 uF + 80 - 20%; 100 V
C11	21-11015A07	.01 uF + 80 - 20%; 100 V
C12 C13	21-82187B04 23-84538G04	270 pF ± 10%; 500 V 15 uF ± 10%; 25 V
C14	21-82610C58	100 pF ± 10%; 100 V
C15,16	23-11019A09	1.0 uF ± 20%; 50 V
C17, 18	21-82610C58	100 pF ± 10%; 100 V
C19	21-11015B13	.001 uF ± 10%; 100 V
C20	21-82187B04	270 pF ± 10%; 500 V
C32, 33	23-84538G06	47 uF ± 20%; 20 V
C34	21-11015A07	.01 uF + 80 - 20%; 100 V
C38, 39	21-11015B13	.001 uF ± 10%; 100 V
C40	21-11015A05	.0047 uF + 80 - 20%; 100 V
C41	21-11015B13	.001 uF ± 10%; 100 V
C42 thru 45	21-83406D81	20 pF ± 5%; 500 V
C46	21-11015A05	.0047 uF + 80 ~ 20%; 100 V
OD4 5 6	49 11024701	diode: (see note)
CR4, 5, 6	48-11034D01	silicon Hot carrier
CR7, 8 CR9	48-84616A01 48-11034D01	silicon
		transistor: (see note)
Q5, 6	48-869642	NPN; type M9642
Q7	48-869567	NPN; type M9567
Q8	48-869642	NPN; type M9642
Q9	48-869328	PNP; type M9328
Q10	48-869643	PNP; type M9643
Q11	48-869642	NPN; type M9642
Q14	48-869567	NPN; type M9567
		resistor, fixed; ± 5%: 1/4 W; unless otherwise stated
R1, 2	6-11009E65	4.7k
R3	6-11009E79	18k
R4	6-11009E75	4.7k
R5, 6	6-11009E73	10k
R9, 11	6-11009E97	100k
R15	6-11009E61	3.3k
R16	6-11009E79	18k
R17	6-11009E65	4.7k
R18	6-11009E73	10k
R19	6-11009E53	1.5k
R20	6-11009E83	27k
R21	6-11009E49	1k
R22	6-11009E45	680
R23	6-11009E75	12k
R24	6-11009E73	10k
R25	6-11009E53	1.5k
R26	6-11009E63	3.9k
R27	6-11009E47	820
R28	6-11009E63	3.9k
R29	6-11009E57	2.2k
R30	6-11009F22	1 meg.
R31, 32	6-11009E87	39k
R33	6-11009E93	68k
R72	6-11009E61	3.3k
R73	6-11009E79	18k
R74	6-11009E61	3.3k
R75	6-11009E79	18k
R76 R77	6-11009E97 6-11009E61	100k 3.3k
		integrated circuit: (see note)
U10	51-83629M09	Quad Low Power Operational Amplifier
U11	51-84887K60	Analog Multiplexer
U13	51-84561L76	Voltage Regulator (1.5A)
U14	51-82764K29	Hex Buffer
	me	echanical parts
	2-132616	NUT, 6-32 × 1/4 × 3/32 × 1/8"
	3-136194	SCREW, machine: 6-32 × 3/8"
	7-84560N01	BRACKET, heat sink mounting

SHIELD **note:** For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

26-84434N01

Table 4. SCM/Station Jumper Selection (Refer to Station Module Jumper Charts)

(20)	ejer to Station Moaute Jum _i	ver Charles)
Affected Board	Conditions	Action
Non-unified Main Board TRN5349A (Low Band and VHF 330 Watt Stations)	w/board part no. 84-84212N01	— remove JU15
	w/board part no. 84-83601N01	- remove JU15 - connect option slot pin 10 to SCM pin 10 - connect guard tone decoder pin 13 to SCM pin 19
Unified Main Board TRN4860A		— connect option slot pin 10 to
(Low Band through 960 MHz Low Power and UHF High Power)		SCM pin 10 — connect guard tone decoder pin 13 to SCM pin 19
TSI Module TRN4853A		— remove CR13 — remove R24 — add 47k resistor across C11
Station Control Module TRN4854A	Unified Chassis Stations	— remove Q12
Station Control Module TRN4854B		- remove JU8
Digital Modulator Module TRN4856A		— remove module
F1 Module TLN5293A w/ Optional Link Receiver		— remove C23 and C32
Guard Tone Decoder Module TLN2376A	systems with more than one rf lind (more than 120 ms of HLGT)	c — change C15 to 47 uF; 20%, 25 V tantalum (Motorola Part No. 23-82783B37) in the link transmitters and the paging station)

SIMULCAST CONTROL MODULE

CIRCUIT BOARD DETAIL TRN5379B CONTROL BOARD

parts list

DELAYED KEYED A+

COMPONENT SIDE 8D-DEPS-35432-A SOLDER SIDE 8D-DEPS-35433-A OL-DEPS-35434-8

SHOWN FROM COMPONENT SIDE

REFERENCE	MOTOROLA	
SYMBOL	PART NO.	DESCRIPTION
		capacitor, fixed:
C1, 3	21-11015B13	.001 uF ± 10%; 100 V
C6	23-84538G06	47 uF ± 20%; 20 V
C7, 8, 9	21-11015A05	.0047 uF + 80 - 20%; 100 V
C11	21-11015A07	.01 uF + 80 - 20%; 100 V
C12	21-82187B04	270 pF ± 10%; 500 V
C13	23-84538G04	15 uF ± 10%; 25 V
C14	21-82610C58	100 pF ± 10%; 100 V
C15,16	23-11019A09	1.0 uF ± 20%; 50 V
C17, 18	21-82610C58	100 pF ± 10%; 100 V
C19 C20	21-11015B13	.001 uF ± 10%; 100 V
C32, 33	21-82187B04 23-84538G06	270 pF ± 10%; 500 V 47 uF ± 20%; 20 V
C34	21-11015A07	.01 uF + 80 - 20%; 100 V
C38, 39	21-11015B13	.001 uF ± 10%; 100 V
C40	21-11015A05	.0047 uF + 80 - 20%; 100 V
C41	21-11015B13	.001 uF ± 10%; 100 V
C42 thru 45	21-83406D81	20 pF ± 5%; 500 V
C46	21-11015A05	.0047 uF + 80 - 20%; 100 V
		diode: (see note)
CR4, 5, 6	48-11034D01	silicon
CR7, 8	48-84616A01	Hot carrier
CR9	48-11034D01	silicon
		transistor: (see note)
Q5, 6	48-869642	NPN; type M9642
Q7	48-869567	NPN; type M9567
Q8	48-869642	NPN, type M9642
Q9	48-869328	PNP; type M9328
Q10	48-869643	PNP; type M9643
Q11	48-869642	NPN; type M9642
Q14	48-869567	NPN; type M9567
		resistor, fixed; ±5%: 1/4 W;
		unless otherwise stated
R1, 2	6-11009E65	4.7k
R3	6-11009E79	18k
R4	6-11009E65	4.7k
R5, 6	6-11009E73	10k
R9, 11	6-11009E97	100k
R15	6-11009E61	3.3k
R16	6-11009E79	18k
R17 R18	6-11009E65	4.7k
R18	6-11009E73 6-11009E53	10k 1.5k
R20	6-11009E83	1.5K 27k
R21	6-11009E49	1k
R22	6-11009E45	680
R23	6-11009E75	12k
R24	6-11009E73	10k
R25	6-11009E53	1.5k
R26	6-11009E63	3.9k
R27	6-11009E47	820
R28	6-11009E63	3.9k
R29	6-11009E57	2.2k
R30	6-11009F22	1 meg.
R31, 32	6-11009E87	39k
R33	6-11009E93	68k
R72	6-11009E61	3.3k
R73	6-11009E79	18k
R74	6-11009E61	3.3k
R75	6-11009E79 6-11009E97	18k
R76	6-11009E97 6-11009E61	3.3k
	0 71000201	
1110	E4 B26061400	integrated circuit: (see note)
U10	51-83629M09	Quad Low Power Operational Amplifier
U11	51-84887K60	Analog Multiplexer
U13 U14	51-84561L76 51-82764K20	Voltage Regulator (1.5A)
0.14	51-82764K29	Hex Buffer
	2-132616	echanical parts
	3-136194	NUT, 6-32 × 1/4 × 3/32 × 1/8" SCREW, machine: 6-32 × 3/8"
	7-84560N01	BRACKET, heat sink mounting

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

68P81063E72-B (Sheet 1 of 3) 9/15/83 - V&G

COMPONENT SIDE® BD - DEPS-35435 - B SOLDER SIDE® BD - DEPS-35436 - B .OL - DEPS - 35437 - B

DE

SIMULCAST CONTROL MODULE

MODEL TLN2559B

SYN

PTT CONTRO

LINE PT

DC LINE DISABL

FT WINDOW CNTRU

PL ENABLE

CHAN ELEMENT GNE

DELAYED KEYED A

SYN

KEYED A+

FN TONE HI

INTEGRATED CIRCUIT POWER CONNECTIONS

DEVICE	5 VOLTS	9.6 VOLTS	GROUND
U6	14	_	7
U7	14		7
U10	-	4	11
UII	-	16	6,7,8

FUNCTION

Decodes Function Tone signals and keys the transmitter in response to correct code sequences.

parts list

REFERENCE	MOTOROLA		
SYMBOL	PART NO.	DESCRIPTION	
	3-125790	SCREW, machine: 4-40 × 5/16"; 6 used	
	45-83914G01	GUIDE, card; 2 used	
	46-84703E01	GUIDE, circuit board	
	64-83163L16	PANEL	

EEPS-35431-B

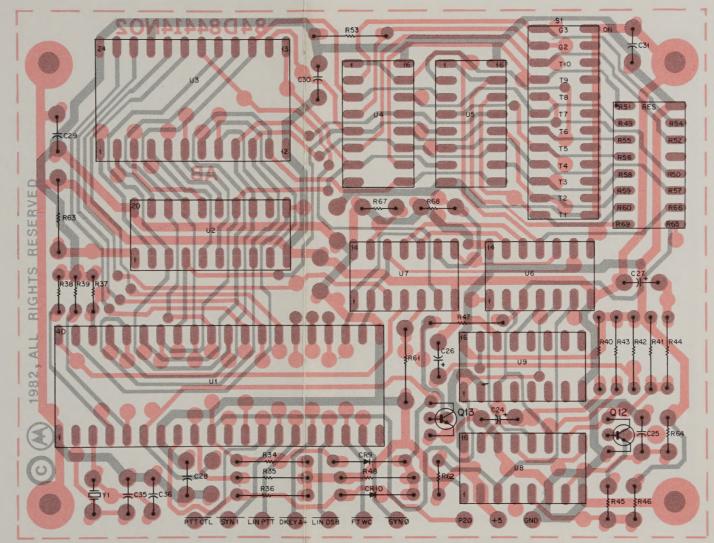
SIMULCAST CONTROL MODULE

CIRCUIT BOARD DETAIL TRN5603B LOGIC BOARD

parts list

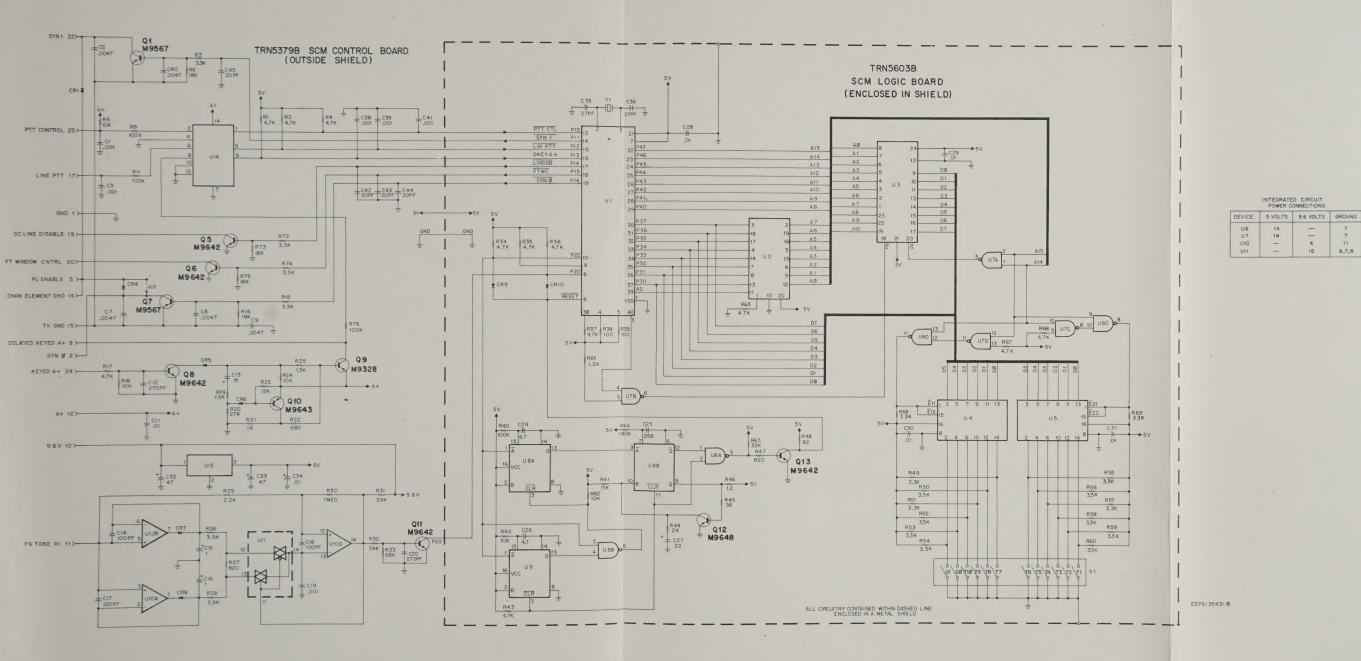
REFERENCE	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed:
C24 *	23-11013D09	4.7 uF ± 10%: 20 V
C25 .	8-11017A15	.056 uF ± 5%; 50 V
C26		
C27	23-11013D09	4.7 uF ± 10%; 20 V
	23-11013C56	22 uF ± 20%; 15 V
C28 thru 31	21-11015A07	.01 uF + 80 - 20%; 15 V
C35, 36	21-11014H35	27 pF ± 5%; 100 V
		diode: (see note)
CR8, 9	48-82392B03	silicon
		transistor (see note)
Q12, 13	48-869642	NPN; type M9642
		resistor, fixed; ±5%: 1/4 W;
		unless otherwise stated
R34, 35, 36	6-11009C65	4.7k
R37	6-11009E65	4.7k
R38, 39	6-11009E25	100
R40	6-11009C97	100k
R41	6-11009C77	15k
R42	6-11009C73	10k
R43	6-11009C65	4.7k
R44	6-11009C10	24
R45	6-11009E19	56
R46	6-11009C51	1.2k
R47	6-11009C47	820
R48		82
	6-11009C23	3.3k resistor network
R49 thru 60	p/o 51-84333G23	
R61	6-11009C51	1.2k
R62	6-11009E73	10k
R63	6-11009E65	4.7k
R64	6-11009F04	180k
R65A, 66, 69	p/o 51-84333G23	3.3k resistor network
R67, 68	6-11009E65	4.7k
		switch:
S1	40-83022M04	12 position; spst
		integrated circuit: (see note)
U1	51-83625M06	Microprocessor
U2	51-83627M03	Octal Transparent Latch
U3	51-83625M94	ROM
U4, 5	51-84561L77	Hex Buffer, 4-bit and 2-bit (3-state)
U6	51-84371K83	Quad 2-input NAND gate
U7	51-84561L04	Quad 2-input NAND gate
U8, 9	51-84561L11	Monostable Multivibrator
		crystal: (see note)
Y1	48-82611M03	3.9672 MHz
	me	chanical parts
	9-84924E01	SOCKET, 24-contact
	14-84602K02	INSULATOR
	29-82713M01	TERMINAL, lug; 20 used

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.



SHOWN FROM COMPONENT SIDE

COMPONENT SIDE® BD - DEPS-35435-B SOLDER SIDE® BD - DEPS-35436-B OL - DEPS - 35437-B



FUNCTION

Decodes Function Tone signals and keys the transmitter in response to correct code sequences.

parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	3-125790	SCREW, machine: 4-40 × 5/16"; 6 used
	45-83914G01	GUIDE, card; 2 used
	46-84703E01	GUIDE, circuit board
	64-83163L16	PANEL

